THE EFFECT OF SCREEN SIZES ON GAMERS' INTRINSIC MOTIVATION WHEN PLAYING GAMES

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ABSTRACT

This thesis reports on a study of the motivation of players of educational or constructive (E rated) games in relation to the screen size they used in game play. Educators have started to use games in the class room to encourage learning, and often they have been using small hand held consoles, but more work was needed on understanding the intrinsic motivation for engagement. Since engagement is what has prompted the uptake of educational gaming, this was deemed an important area to research.

The growing popularity of video games has provoked scholars to look into various aspects of gaming. In this regard, one particular area of investigation is in relation to the intrinsic motivation among the gamers. Multiple screen sizes are found to influence players to play games from various viewpoints. For instance, from handheld consoles such as Nintendo Dual Screen (DS) and PlayStation Portable (PSP) as well as television based consoles like PlayStation 3, Xbox 360, and Nintendo Wii. Despite a significant number of studies on motivation that have looked into how games should be designed in order to motivate gamers, few studies have investigated the effects of screen sizes on them Therefore, this thesis investigates the effect of screen sizes on gamers' intrinsic motivation when playing games.

The present study employed an ethnographically-informed method and a Simulated Gaming Environment (SGE) was created to serve as the "natural" environment for gamers. Participant observation and interviews were conducted for data collection. The Nintendo Wii played on a 40-inch screen and the smaller handheld console the Nintendo DS were the two consoles selected for the study, and Mario Kart (action kart racing game) and the Big Brain Academy (education game) were the games involved in this study. In order to validate the data and to retrieve additional information, a stimulated recall interview was performed.

Upon assessing the inductive results emerging from the data of the study, it was concluded that in order for an individual to be intrinsically motivated in playing a game it depended on two factors; i) the enjoyment elements of playing the game; and ii) the personality type of the gamer. In the event of individuals wanting to feel intrinsically motivated, he/she must enjoy playing the game. In the case of the present study, the five enjoyment elements involved were: i) focus and concentration, ii) challenge, iii) immersion, iv) social engagement, and v) control. Another dominant but unforeseen theme that emerged from the data revealed that screen size preferences are influenced by the gamers' personalities (i.e., introvert or extrovert). It has been found that extrovert gamers prefer playing games on big screens due to the support of social interaction, whereas introverts prefer a small screen owing to its personal space. The relationship between enjoyment and the personality types of gamers has been found to have a significant impact on the intrinsic motivation of gamers in relation to selected screen sizes.

In regards of using game consoles and educational games in classroom, the present study suggests that it would be beneficial to first identify the type of learners, then the suitable game consoles (i.e., big screen or small screen handhelds) with the support of appropriate activities being assigned to their type of personality. As for game developers and designers, this study could provide another attribute (gamers, personality type, and enjoyment) to consider when designing games in accordance to screen sizes

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ATTESTATION OF AUTHORSHIP

I hereby declare that this submission is my own work and that, to the best of my knowledge and belief, it contains no material previously published or written by another person (except where explicitly defined in the acknowledgements), nor material which to a substantial extent has been accepted for the award of any other degree or diploma of a university or other institution of higher learning.

Noor Fardela Zainal Abidin: _____

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PUBLICATIONS

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ETHICS APPROVAL

The ethics approval for this research was approved by the Auckland University of Technology Ethics Committee (AUTEC) on the 6th November 2011, AUTEC reference number 11/16.

1. INTRODUCTION

The present study has attempted to look into the influence of different screen sizes on gamers' intrinsic motivation when playing games, based on research conducted between 2009 and 2016. More specifically, it examines gamers' behaviours, emotions, and verbal comments in the course of playing the game. The two game genres considered were the action (kart racing) game Mario Kart and an education puzzle game named the Big Brain Academy. Both games were played on two platforms, a Nintendo Wii console with a 40-inch television screen, and a Nintendo DS, which uses a 3.14-inch dual screen monitor. In terms of the methodology, an ethnographic participant observation method was employed for data gathering. It is also worthy of note that the present study has also discussed some aspects of using games and game consoles in classrooms and how screen sizes may possibly affect the intrinsic motivation of the students.

Chapter 1 provides an overview of the research conducted. It explains the background of the study, the researcher's personal background, factors that motivated the present study. Upon discussing such aspects, the main research question is then described, following which the significance of the study is highlighted. Finally, the structure of the thesis is presented.

1.1 Background of the study

Video games (now typically referred to simply as 'games') have come a long way since ATARI's introduction of the first arcade game, Pong, in 1972. Interestingly, video games have over the years evolved from the originally black and white two-dimensional graphics into the present 3D graphics with amazing storylines. In addition, they have also become common household items as a result of the invention of technologically advanced

consoles such as the PS4 and the Xbox. Related studies have discussed the portable devices such as the Portable PlayStation and the Nintendo DS as capable of providing a more flexible and portable gaming experience for gamers. It has also been found that individuals of all ages enjoy games from a wide range of genres such as first-person shooter games, puzzle games, massively multiplayer online role-playing games, and strategy games. The recent technological advancement has made it possible for these games to be available on smart phones or tablets, which in turn have made it easier for gamers to conveniently play anywhere and anytime. In terms of the revenue, it was found that the global video game market had proven to be economically successful i.e., earning USD 23.5 billion in the year of 2015. Such revenues include game console hardware and software, online, mobile, and PC game sales, which observed a 5% increase from the previous year (Morris, 2016). Considering the success to date, it is safe to assume that video games are almost becoming part of our lives as gamers are reportedly spending a vast amount of time playing their favourite games.

The recent developments of gaming did not only affect the lives of the general public but they have also equally provoked scholars to look into this area rigorously. In this regard, among the various studies carried out to date include the negative and positive impact of video games to gamers, game development, game theories, game methodologies, games in education, health issues in relation to gaming, and human computer interaction issues in games (Zaphiris & Ang, 2007; Barr, Noble, & Biddle, 2007; Griffiths, 1999).

As it was reported in the literature, the motivation of gamers spending mostly hours and sometimes days, playing a certain game is intriguing and therefore, it can be an interesting area to look into. It has to be noted that playing games can be an intrinsically motivated activity among gamers. This is because it is mostly considered as a self-satisfying one to

pass the time for many individuals. With regards to its definition, it can be discovered that intrinsic motivation refers to the motivation that is driven by an interest or enjoyment about the task itself (Ryan & Deci, 2000). Notwithstanding, the presence of certain elements such as concentration, challenge and fantasy is required to be part of the activity or game to help instil intrinsic motivation within an individual (Csikszentmihalyi, 1975; Malone, 1980; Malone & Lepper, 1987; Sweetser & Wyeth, 2005). Some of the specific elements that encourage intrinsic motivation are enlisted within the GameFlow model and Malone and Lepper's Taxonomy of Intrinsic Motivation towards learning. The theoretical underpinnings of such models are discussed in detail in the following chapter, the literature review, and also appear later as they relate to results and the discussion.

The present study also investigates whether screen size plays a role in gamers' intrinsic motivation. The ready availability of multiple screen sizes means it is possible for players to experience games from various viewpoints, from handheld consoles such as the Nintendo Dual Screen (DS) and PlayStation Portable (PSP) through to television-based consoles including the PlayStation 4, Xbox 360, and Nintendo Wii. Screen size can be as small as 3 inches to very large such as a 72-inch display.

A review of the literature (reported in Chapter 2) reveals little evidence of research that discusses whether gamers' intrinsic motivation in playing games could be affected when dealing with different screen sizes. In addition, a significant number of studies have shown that investigations into motivation have mostly focused on how a game should be designed to be motivating (Bostan, 2009; Malone & Lepper, 1987; Sweetser & Wyeth, 2005) but studies looking into the effects of screen sizes have been scarce. On the other hand, studies focusing on screen sizes were mostly focused on the appropriateness of the content being displayed on the screen in order for it to be more usable, especially to cater

for small sized devices (Churchill & Hedberg, 2008; Karkkainen & Laarni, 2002; Lee & Boling, 1999).

Moreover, the testing approach employed in relation to the application of the GameFlow model prevalent in game evaluation was based on reviews from experts as well as questionnaires (survey) (Fu, Su, & Yu, 2009; Sweetser & Wyeth, 2005). The literature reviewed noted that future works may have to consider using observation or play-testing in the event of using GameFlow model to measure player's enjoyment.

The present study therefore aims to bridge the methodological gap by means of employing an ethnographically-informed method, to understand the effect of screen size on gamers' intrinsic motivation during actual gameplay. There has been little use of ethnography in measuring the intrinsic motivation of gamers; here, I explore the use of an ethnographically-informed method in studying gameplay, by focusing on gamers playing on different screen sizes. The GameFlow model was closely referred to in the course of the analysis phase of this study to map onto the results of the present study. However, it is worth highlighting that the present study does not test or verify the elements identified within this theory; rather the intent is to derive a new theory inductively, which could form guidelines for measuring players' intrinsic motivations when playing games.

1.2 The Researcher: A Brief Background

As my research was ethnographically-informed the researcher is essentially the research instrument. It is therefore important that the reader understand the motivation and background of the researcher. My personal and professional backgrounds have to some extent motivated my interest in this research area. In particular, I became interested in the

world of animation, graphics, entertainment, and games, when I was pursuing my Master's degree in Interactive Multimedia at Heriot-Watt University, Scotland. In the course of doing my masters in 2002, I was introduced to the subjects of Human Computer Interaction (HCI), usability evaluation, multimedia design and development, and online education as part of the degree program. My dissertation looked into the users' responses in relation to using multimedia courseware as a learning tool. Specifically, my master's dissertation looked into designing, creating, and evaluating multimedia education courseware.

Upon reporting back for duty as an academic staff at the College of Information Technology in the Graphics and Multimedia Department, Universiti Tenaga Nasional (UNITEN), I realized that video games had started to be part of my students' activities. It was also in the same year that I met my spouse who is an avid gamer. I was fascinated by his motivation and excitement every time I saw him in his gaming environment. With keen interest, I used to spend time watching his friends along with my family members playing different game genres. As he was knowledgeable, he also introduced me to multiple game consoles. Upon some self-exploration, I became more familiar with Pac Man and Tetris, which I used to play in arcades and on a brick game device. My spouse also introduced me to more exciting games such as Super Mario Bros, Super Smash Bros Brawl, Enchanted and many more. The exposure to such games increased my level of curiosity about the factors motivating people to play these games.

As the years went by, new consoles and games were introduced. Interestingly, graphics were enhanced and made to become more like real-life situations. Consequently, the challenge of designing such games and making them more interesting has increased. I was particularly excited with the creation of a puzzle game called WarioWare and an

educational game with the name of Brain Age Game. Such games are played on a small dual screen device known as the Nintendo DS. Personally, I categorise both games as brain teasers as they test individuals' patience, precision, math skills, drawing, and vocabulary. Researchers had also begun discussing how games can be used in classroom settings, in education, as well as the negative or positive impact their use can have on gamers.

In the year of 2009, I was offered a scholarship to pursue my doctoral degree looking into the human computer interaction and gaming. My initial interest was on how brain games on small-screen devices can motivate a person to play, therefore I decided to explore the difference between two screen sizes. I also wanted to look at the possibility of using small screen consoles with educational games as a learning tool in schools and classrooms. As the research unfolded, I realised that enjoyment as well as personality play substantial roles in determining the motivation of a person in playing a game and screen size also has a significant influence on the gamers who play the game.

1.3 The Origin of This Research, My Assumptions and Its Objectives

When I began embarking on this study, I had three main interests in mind: human behaviour towards games, how educational games or puzzle games can help people, and handheld consoles. As it was mentioned earlier in section 1.2, the entire journey began upon watching my spouse and his friends spending hours upon hours on a particular game. It fascinated me to see their reactions, emotions, and behaviour during game play. Once I was immersed in the gaming world, my interest began growing to explore puzzle games and problem solving games on small-screen devices. I could not cease to wonder if such games could be useful in classroom settings.

I had two major assumptions prior to embarking on this study. First, it was always my personal belief that games such as first-person shooters, strategic games, and racing games are the only games that can help motivate gamers to play for relatively longer period. However, upon trying mind challenging games and seeing others becoming really interested in puzzle games such as Professor Layton and the Curious Village or Brain Age: Train your brain in Minutes a Day, I learnt that various other game genres are equally capable of instilling motivation among players as long as they have the basic flow theory elements embedded within them.

Figure 1-1 shows the conditions, which are necessary to achieve flow. Flow theory explains that if an activity is too challenging, a person would grow frustrated, whereas if the challenge is too easy, a person will become bored. In order to achieve flow, a balance between a person's skills and the challenge of the activity should be found (Csikszentmihalyi, 1990).

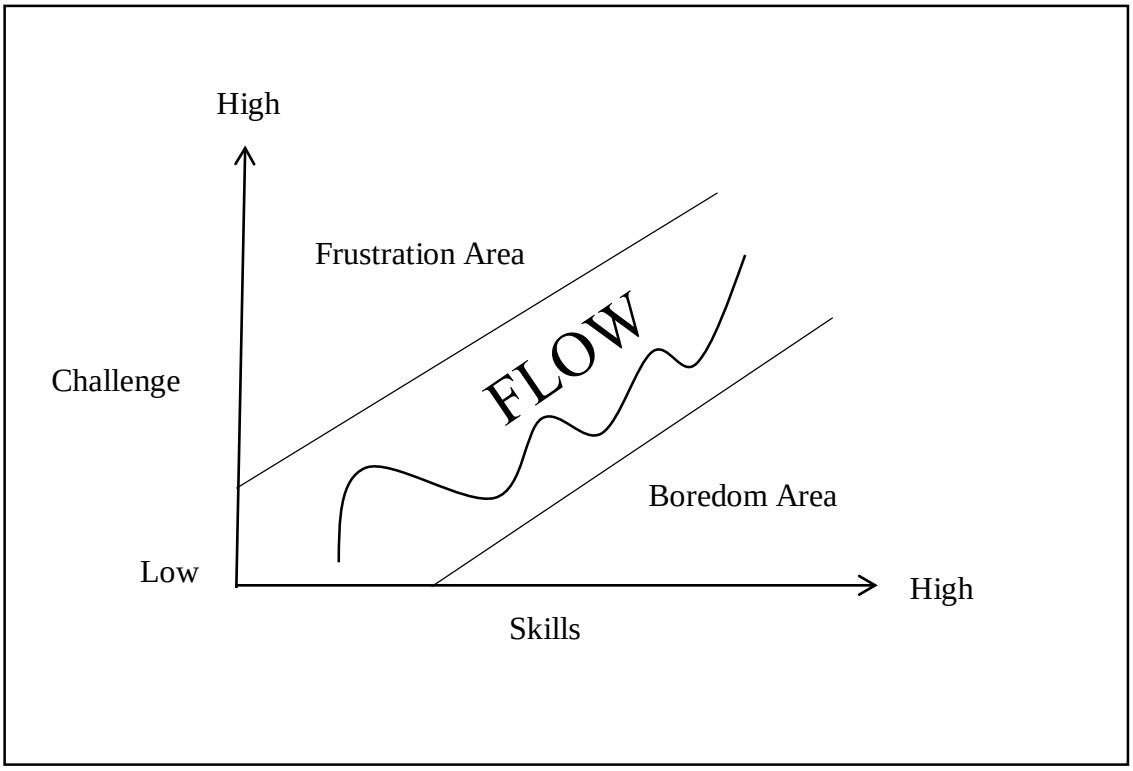


Figure 1-1 Three conditions based on Flow theory - Adapted from (Csikszentmihalyi, 1990)

I also realized that many puzzle or IQ games were played on small screen handheld consoles, beginning with the creation of the brick game console, to the Game Boy through to the Nintendo DS and the PlayStation Portable. Such a development led to my second assumption, that individuals are motivated to play handheld consoles only due to the portability. However, the increase in popularity of these handheld game consoles and the multiple genres that are created for these consoles might suggest other factors are influencing use as well. The need for further research on the motivation of those using handheld consoles, and the possibility to use educational games on handheld consoles to serve as a learning tool, inspired the present study.

In addition, it is a common assumption that a big screen is the best choice for gaming; however, the creation and widespread adoption of handheld consoles (with a screen size of 3 to 4 inches only) might indicate that gamers also like to play on small screen devices. Drawing the above threads together I decided to investigate positive games, that is, games that are fun and family-friendly, exemplified by a racing game and a simple IQ test game, when experienced using two Nintendo consoles, the Nintendo Wii, which is designed to be played on a big screen, and the Nintendo DS, which is a 3.4-inch dual screen hand-held device.

Drawing on the interests and assumptions just described, the main objective of this research was to study the potential effect of screen size on gamers' intrinsic motivation when playing games. This present study thus explores the factors that motivate gamers when playing an educational game and an action racing kart game on one large and one small screen device.

1.4 Research Question

High-quality research generally begins with a statement of the initial goals and objectives of a study and the associated research questions. Even in ethnographic research, with its inherently exploratory nature, it is still wise to start by "developing guiding research questions" (Murchison, 2010, p. 38). The importance of "developing a research question or a set of research questions is a key part of the process of narrowing the focus to a manageable frame" (Murchison, 2010, p. 38). The research question should also help in shaping the people, place, or a program to be studied (Fetterman, 1998).

This main research question considered in the present study is: "Does screen size affect gamers' intrinsic motivation when playing video games?" If so: "How does screen size affect gamers' intrinsic motivation?"

In understanding that this is an ethnographically-informed research study, it is possible that new research questions might "emerge from the data", given that the focus of the research is to learn from the gamers. Forsythe (1999) states that "in doing ethnography, initial research questions are carefully refined and pursued as "*fieldwork*" develops" (p. 131). As the analysis of the research is undertaken parallel to the study, Murchison (2010) states that a revised list of research questions might arise during the study and the central research question might also change.

1.5 Rationale of the Study

This present study adds to existing knowledge on the intrinsic motivation of gamers, focusing particularly on the effects of different screen sizes and in accordance with different game genres. The goal of the present study is to determine whether screen size

affects the gamers' intrinsic motivation while playing a game. Ascertaining which screen sizes intrinsically motivate game play may be an important factor when motivating gamers to play beneficial games such as educational games (to improve learning skills or memory) or platform games (to improve hand-eye coordination).

In the US, the increasing interest in using games to educate has led to The Serious Games Initiative, where a group of researchers and teachers address the educational and enterprise uses of games. Each year, the initiative holds a summit that showcases research and development projects involving the use of games in education, training, health and public policy (Intille, Larson, Beaudin, Nawyn, Tapia, & Kaushik, 2005; Voth, 2007). Numerous studies have revealed that certain game categories can either help gamers acquire knowledge, or train the gamers' physical or mental skill (ExperienceLab, 2011; Rankin & Vargas, 2008). A significant number of research studies concluded that computer games may be useful in motivating learning and promote the use of game consoles and appropriate video games to encourage learning (ExperienceLab, 2011; Habgood, Ainsworth, & Benford, 2005; Lee, Luchini, Michael, Norris, & Soloway, 2004; Rankin & Vargas, 2008).

It is essential to understand the game experience of gamers in order to understand the appropriateness of certain game consoles in motivating learning and positive gaming. Lee & Peng (2006) stated that the understanding of the intrinsic nature of the gamers can enhance the understanding of game experience. The understanding of what intrinsically motivates a person to play a game is a key factor addressed in this study.

The second factor is to understand whether screen size affects the intrinsic motivation of gamers when they play the same game on different consoles and displays. Grabe,

Lombard, Reich, Bracken, & Ditton (1999) concluded that there is no consistency in findings that people enjoy viewing larger images more than smaller images. The preference for a larger or smaller screen may be influenced by the social context of the viewing experience. Small screens might be preferable in personal settings while large screens might be preferred in shared public environment.

There have been mixed reviews on the effects of screen size on user' experience for the workplace, entertainment, and gaming. Czerwinski, Robertson, Meyers, Smith, Robbins, & Tan (2006) analysed the use of large displays and revealed that they increase user productivity, aid user recognition memory and in some cases eliminate gender biases (e.g., while navigating in 3D environments). Furthermore, numerous usability problems such as cursor tracking, dealing with the screen bezel, window management and task management were also identified. Bi & Balakrishnan (2009) indicated that users prefer larger displays rather than single and dual monitor configurations in their daily work environment.

There is also research evidence that certain tasks do not benefit from the use of very large displays. Tasks such as reading comprehension are not advantaged when using large displays but users perform better undertaking spatial orientation task on large displays (Tan, Gergle, Scupelli, & Pausch, 2006). Tyndiuk, Thomas, Lespinet-Najib & Schlick (2005) studied the impact of large displays on the performance of different kinds of 3D interaction tasks, concluding that users do not benefit from the use of large displays, and that performance gains depend on the nature of the interaction task as well as users' cognitive profiles.

In understanding gaming experiences there is mixed evidence regarding the effect of screen size. Sabri, Ball, Fabian, Bhatia & North (2006) concluded that using a large high-resolution screen (9 monitors, 2400x1800) can enhance gaming experience when playing a real-time strategy game. Laarni, Ravaja & Saari (2005) claimed that participants experience a relatively higher sense of presence when the game they were playing was projected on a large screen, but that intentional engagement was at the same level when playing whether using a PC or PDA. Even though there is some sense that large screen use could be a preferred choice for a better gaming experience, there has also been interest in the use of small screen consoles. A study revealed that playing Nintendo DS (a small screen device) provides more control in terms of portability and privacy, and players have the tendency to be more immersed in the game (Evans, 2006 as cited by Pulman, 2007). Other researchers implied that small screen handheld consoles have potential in learning environments (Braun & Clark, 2006; Bunce, 2010; Rubin & Rubin, 2005). Given such a backdrop, this study aims to determine whether players or learners are more intrinsically motivated in playing educational, puzzle, or action games in smaller screen handheld consoles.

Based on the reviewed literature, there is insufficient knowledge on the effect of screen sizes on gamers' intrinsic motivation to play a game. Lee & Peng (2006) states that:

> Most existing literature usually focuses on the effects of media content and neglects the impact of media form. Understanding the impact of media forms (such as size, motion, audio) are important factors in determining the psychological impact of media. Studies on the main effects of computer games' form factors and possible interaction with content types are needed in order to get fuller understanding of game effects towards the gamers (p.340).

The theory arising from this study can contribute towards a greater understanding of gamers' experience, particularly in relation to the use of game consoles and screen sizes.

Furthermore, this present study should aid in informing the use of suitable game platforms or consoles for specific fields, such as education or entertainment. For example, creating educational games for classroom learning might be more beneficial and motivating for students when they are designed on small screen devices. In addition, the theory derived from this study can be a reference for academicians and researchers to explore intrinsic motivation on other game genres, screen displays (3D screens), or devices that support gaming (iPAD vs. iPOD).

Last but not least, this study should have methodological value in terms of exploring the use of a Simulated Gaming Environment (SGE) (refer to section 3.4) as the "*field*" within which to gather ethnographic data using participant observations and interviews as the means of data collection.

1.6 Overview of the Thesis

1.6.1 Organization of the Thesis

This thesis is presented in seven core chapters and several supplementary appendices. This first chapter, **Chapter 1**, introduces the background and motivation of the research. It describes the origin of this research and the derivation of its objectives. Moreover, the main research question and the rationale of the study were introduced, together with the overview of the structure of the thesis.

Chapter 2 reviews prior literature on motivation and gaming. It begins with an overview on theories of motivation and an explanation of intrinsic motivation. It then discusses motivation theories and elements in relation to gaming and learning. Also, the work on flow theory, GameFlow model, and theory of enjoyment were reviewed. The chapter

continues with the background summary on game consoles and the relationship to screen size. Lastly, this chapter reviews studies on screen size, gaming and using consoles in classrooms.

Chapter 3 presents the research design adopted for this study and it begins with the discussion on the research approach. The background of qualitative interpretive research and the reasons for choosing this research method (ethnographically informed) are explained. Moving on, the chapter continues with the discussion on the background research on ethnography, and ethnographically informed studies, especially in computer studies. The research design of the present study is then discussed, which begins with the ethical considerations involved. The argument and solution of creating an SGE as a field of study for ethnographically-informed research are explained. This is followed by the discussion on the setting up of the SGE, the description of choosing the genre, the games chosen for this study, the console and the participants. Next, the data collection process of the research that includes participant observation, interviews and stimulated recall interview is explicated. A brief discussion of the pilot study conducted to verify and justify the use of the SGE, as a gamer's natural environment for ethnographic research and the data collection method mark the conclusion of this chapter.

Chapter 4 discusses the data analysis process of all the data obtained which includes participation observation videos, stimulated recall interviews, and observation notes. It describes the data analysis protocol used for this study and provides an explanation of how this research maintains its interpretive rigour.

Chapter 5 presents the results of data analysis. It includes the ethnographic story, which entails the process of the participant observation and the voices and behaviour of the

gamers. The inductive themes that emerged from the data are then presented. There are two major themes: a) the type of gamers (introvert and extrovert) and b) the enjoyment factors that influence gaming accordance to screen size. Finally, the chapter concludes and reflects on the ethnographic story.

Chapter 6 presents the discussion relating to the themes and ties the findings to the existing literature. It discusses the unexpected findings of the research.

Chapter 7 concludes the thesis by answering the research question and its objectives. The chapter ends with a discussion on the limitations and recommendations for future research.

Appendix A presents the ethics approval memorandum. This memorandum is the approval for data collection procedures.

Appendix B contains the advertisement for recruitment of participants.

Appendix C features the details provided to the participant in term of the procedures and steps taken in conducting the thesis.

Appendices D & E are samples of the consent forms given to the participants. The forms differ in terms of the study conducted for individuals or multiplayers.

Appendices F, G & H report the protocols followed during the participation observation sessions.

Appendix I explains the interview questions that might arise after participant observation or during the simulated interview recall sessions.

The words ‘thesis, ‘research’ and ‘study’ are sometimes used interchangeably to refer to the work presented in this thesis.

1.6.2 Thesis Style

The thesis adopted an interpretive epistemology, and an ethnographically-informed approach to tell the ethnographic story. The first-person style is used to narrate the process and the results of this study. As an ethnographic writer, explaining the interaction between the researcher and the participants in the first-person style is in keeping with the interpretive research principles of contextualization and interaction (Klein, 1999; Md Amin, 2015). Webb (1992) also argued that the use of the first person is more suitable for a qualitative and interpretive study and is in fact essential to establish rigour by using a reflective approach, where researchers discuss honestly their influences, choices and decisions.

2. LITERATURE REVIEW

2.1 Introduction

In this chapter, some of the closely related studies, which have looked into intrinsic motivation, video games, and screen size, are comprehensively reviewed. Specifically, the first part of this chapter (i.e., 2.2 – 2.6) reviews related works on motivation. Upon reviewing such studies, the focus then shifts to the intrinsic motivation and gamers' motivation to play games. Flow theory, the GameFlow Model of enjoyment and other enjoyment theories, in relation to theories of gamers' enjoyment are then explained. Other related works on motivation in the field of education and their relationship with games are then reviewed. The second part of the literature (i.e., 2.7 – 2.9) pursues the discussion into the screen sizes. It first focuses on explaining the evolution of screen sizes and how different sizes have influenced the growth of game technology. The focus of the discussion progresses to comprehensively reviewing and explaining previous studies relating to screen size and video games. In addition, literature on the use of consoles as an educational learning tool in classrooms are also reviewed. Finally, the chapter ends by delineating some background with regards to the methodology employed, which is ethnographically-informed and justifying the selection of such a method.

2.2 The General Foundations of Motivation

Various studies along with theories have been developed over the years to help better understand motivation among humans. In the early 1800, a philosopher with the name of James Bertham posited that all individuals are motivated by their desire to avoid pain and find pleasure thus resulting in the theory of "the carrot and the stick" (Shah & Shah,

2009). In addition, James Bertham's theory argues that the traditional approach of motivating individuals either at work or school is by either punishment or reward.

On the contrary, other theories such as Maslow and McClelland argued that motivation to human needs such as survival, security, social interaction, self-esteem, self-actualisation, power, affiliation, and achievement may help motivate individuals to act on certain tasks (Chapman, 2009; Maslow, 1943). Ryan and Deci (2000) clarified that a person who has "no feeling or inspiration to act is characterised to be unmotivated, whereas someone who is energised or activated toward an end is considered motivated" (p. 54).

Upon synthesising such theories, it can be learnt that the theories of motivation point to individuals needing something that may serve as a drive for them to complete or excel in performing certain tasks. As scholars have classified, motivation can be divided into extrinsic (external) and intrinsic (internal) motivation. Specifically, extrinsic motivation is in the event of a person being driven by rewards or the fear of being punished. A review of studies revealed that scholars have widely concluded that extrinsic motivation is when an activity is performed to earn something positive (for instance, good grades, bonus, awards) or to avoid something negative (for instance, salary cut, punished by parents) (Hancock, 2010; Ryan & Deci, 2000). Despite the argument by some researchers that extrinsic motivation plays a significant role in why people do their tasks, some others have also argued that it does not guarantee performance. In other words, a person that has extrinsic motivation is doing something because someone has asked him/her to do it, in the event of not having the reward or punishment, the motivation may just disappear. As Kohn (1999) stated, an activity can be deemed less enjoyable if the reward (for instance, money, awards, praised) is the only reason an activity is carried out. It is implied by some

writers that a task or activity has to be enjoyable to the individuals so that it will remain motivating.

On the other hand, intrinsic (internal) motivation is in the event of an individual performing a task due to his/her own interest in the activity in which he/she is engaged. It is often argued that a person's performance may improve if they enjoy and love what they are involved in. In relation to the video games, designers and researchers have widely looked into methods and various other factors that can engage intrinsic motivation among gamers and as a result, get them to invest their time in playing the video games. In this regard, researchers have examined various factors and methods that could foster intrinsic motivation in playing games, which might also increase enjoyment and engagement in using a particular gaming application or technology (Birk, Atkins, Bowey, & Mandryk, 2016, Ryan, Rigby, & Przybylski, 2006).

The studies reviewed above point that intrinsic motivation significantly contributes to the gaming industry. The present study further discusses the factors, elements, and theories, which may help contribute to gamers being intrinsically motivated in playing certain games.

2.3 Intrinsic Motivation

Intrinsic motivation can be defined as doing an activity because of its, "inherent satisfaction rather than for some separable consequences" (Ryan & Deci, 2000, p. 56). Individuals, by and large, engage in such activities as they find them both interesting and enjoyable (Ryan & Deci, 2000). In their review, Ryan and Deci (2000) discovered that intrinsic motivation is not only defined as performing a task that is interesting, but it is

also the satisfaction that an individual obtains upon accomplishing the task they love. In related studies, between the 1940s to the 1960s, two behavioural theories were developed concerning intrinsic motivation. It can be learnt that the "operant theory" (Skinner, 1953, as cited by Ryan & Deci, 2000) maintains that almost every behaviour is motivated by reward, wherein the reward for intrinsically motivated activities is embedded within the activity itself. Such a development led researchers to look into what makes a task interesting. The "learning theory" (Hull, 1943, as cited by Ryan & Deci, 2000) argues that almost all behaviours are motivated by physiological drives; intrinsically motivated activities are tasks, which offer inner satisfaction to the individual concerned. Both theories apply to playing computer games. The game itself (activity) can be considered as sufficiently motivating and the individual should be satisfied and motivated to play the game.

2.4 Existing Literature on Gamers' Motivation

Historically, the video game industry has come a long way since the very first arcade game Pong, which was introduced in the year of 1972. Since then, video games have significantly evolved across all platforms. Scholars have over the years shown keen interest to look into players' motivation to play games (Kahn, Shen, Lu, Ratan, Coary, Hou, and Williams 2015). Importantly, a better understanding into the factors that enhance the gaming experience can benefit both researchers and game developers to improve gaming usage in a more positive manner. As it can be seen from further discussion throughout this thesis (chapters 2 and 6), gaming can be beneficial in many areas such as education, health, or self-satisfaction.

Relying on the self-determination theory, Przybylski, Rigby, and Ryan (2010) argued that the motivation to play games can be linked to how gaming meets basic human needs. In addition, they suggest that the motivation for video gameplay is connected to needs of competence, autonomy, and socialisation. In particular, the competence need is the opportunity to have fun or to possess a special skill in the course of carrying out something. In contrast, the autonomy need is in relation to the feeling of being in control or in charge of something whereas socialisation provides gamers the opportunity to get socially involved in gaming environments.

Upon investigating online gaming, Yee (2006) found that motivation to play can be grouped by achievement, socialising, and immersion. The achievement component specifically covers advancement (i.e., to gain power, progress, accumulate in-game wealth and status), mechanics (i.e., to analyse rules and system order to optimise character performance), and competition (i.e., to be able to challenge and compete with others). On the contrary, the social component allows the players to socialise by means of chatting and helping other gamers, having opportunities to establish relationships with others and achieving the satisfaction of being part of a group or team. The immersion component includes discovery, which is the opportunity to discover new things. Role-playing can be considered as an opportunity to create individuals' own identity with a background story. Customisation on the other hand is the ability to create and customise individuals' own characters. Escapism is widely considered as the opportunity to use the online environment to escape from real life problems. His model, which is empirical-based about better understanding gaming motivation might help, "researchers clarify whether certain kind of players are more inclined to problematic usage whereas for game developers, the findings of his research may clarify how certain game mechanics can attract or alienate certain kinds of players" (p. 774).

Additionally, a qualitative study carried out by Sin, Talib, Norishah, Ishak, and Baki (2014) revealed that gamers continually play games and that they like playing because of the level of challenge associated with the game, the power of control the game provides, and the constant update that the game provides. The related studies reviewed were found to have focused on how gaming experiences and the game itself motivate gaming among individuals.

Other than the factors outlined in the foregoing discussion, Westwood and Griffiths (2010) argued in their study that identifying the type of gamers is equally important to motivation. Specifically, they stated that each type of gamer is motivated by different factors. According to their study, there are six types of gamers with similar and unique elements of motivation.

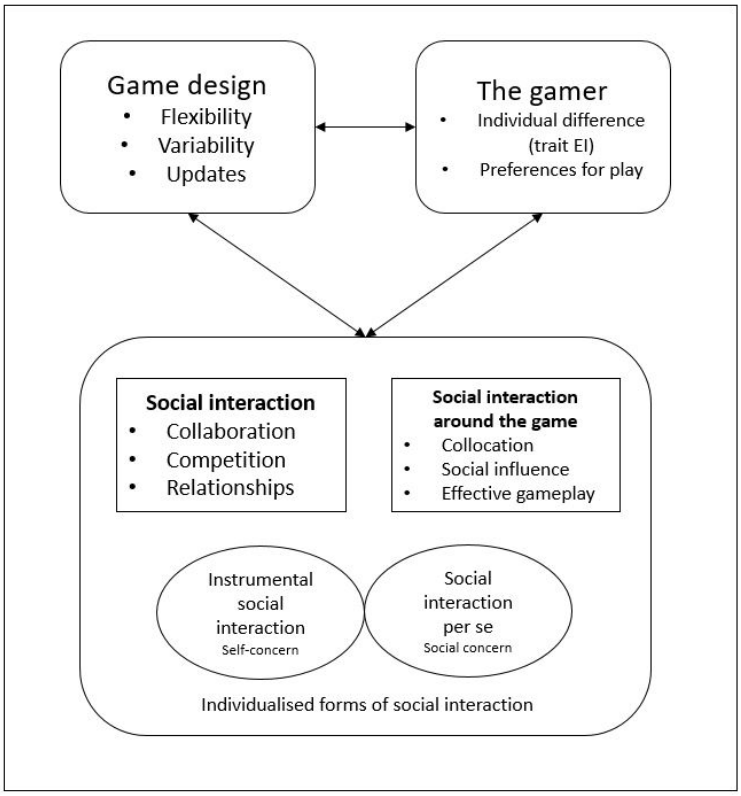
> They are: "a) story-driven solo gamers (motivation is associated with personal fulfilment, immersion, well written story); b) social gamers (motivation is deemed as a social activity); c) Solo limited gamers (motivation is considered as an instant gratification); d) hardcore online gamers (motivation is seen as social group, achievement, graphics of the game, immersion); e) solo control/ identity gamers (motivation is felt as personal enjoyment, strong storyline, high quality graphics and gameplay, story-driven and character creation); and f) casual gamers (motivation concerns personal enjoyment, good graphics, leisure activity short and mission based games)" (pp. 582-583).

Another relatively recent study carried out by Kahn et al. (2015) offered a new scale for player motivation that helps examine two game genres and two cultures. Particularly, they argued that motivation can be divided into six dimensions of gamers, which are socialisers, completionists, competitors, escapists, story-driven, and smarty pants. The socialisers dimension posits that players are motivated by social interaction either with

other players, friends or making new friends. The completionists dimension delineates that players are motivated by the passion to explore every element of the game they are playing. On the contrary, the competitors are motivated by the desire to become the champion of the game. The escapist dimension uses the game to escape or distract themselves from real life problems they are facing. The story-driven dimension is motivated by the storyline and background of the game characters, whereas the players in the smarty pants dimension are motivated by their interests in using games to improve their brain power and intelligence.

In the study of Herodotou, Winters, & Kambouri (2015), the researchers argued that "game motivation is a dynamic phenomenon that requires synergy of the gamer, game design, and social interaction" (p. 260). They designed the Model of Game Motivation (MGM), which integrates psychological, social, and technological aspects in gaming. Particularly, the MGM was designed to serve as a guide and to help better understand game motivation. Figure 2-1 shows the empirically iterated version of MGM. In this regard, the top part indicates that the technological part of the 'game design' is important in promoting game motivation. The psychological characteristic of 'the gamer' influences the game choices and game motivation. The emotional intelligence (EI) trait of the gamers can exert influences on their motivational aspect in gaming such as their need for competition and social interaction. In contrast, the social aspect of the game motivation refers to both inside (i.e., inside the game) and around (i.e., social interaction) the actual gameplay. "Collaborative practices are either a demonstration of the gamers' interest in social interaction per se (social concern) or a means to achieve a certain game goal (self-concern)" (p.260). They explained that gamers' motivation can be influenced by both social interaction within the game and with its surrounding. It also depends on the gamers' emotional characteristics (trait EI), individual differences, game choices and the presence

of others in the game. Related studies have recommended elaborating the MGM for studying gaming motivation by specifically looking into the psychological profile of the gamers, other game types, and the motivation of educational games. As their study employed questionnaires and in-depth interviews, therefore they suggested that additional methods of data collection such as observations of game play may offer better insights to learn about gaming motivation.



Adapted from Herodotou, Winters, & Kambouri, (2015) , p. 261.

Figure 2-1 the empirically iterated version of the Model of Game Motivation (MGM).

In addition to the above-mentioned factors, some of the motivational gaming studies have recommended using educational games in classroom settings as teaching methods. Taking such recommendations into consideration, the researcher of the study felt that it is important to better understand children's motivation in playing games as they are major users of games. There are only minimal differences in children's motivation for playing

games. Olson (2010) found that children's motivation to play video games can be grouped into three types. Firstly, social motivation suggests that gaming provides opportunities to spend time with friends, embarking on joyful competitions with others, making new friends, as well as the opportunity to lead and teach among themselves the gameplay of the chosen game. Secondly, emotional motivation allows gamers to relax, better manage their anger and forget problems, as well as coping with loneliness. It also can help them get rid of negative feelings and promote a positive mood and provide an opportunity to have fun. Lastly, motivation is intellectual and expressive, in which gaming provides challenges and mastery, the opportunity to express creativity, have curiosity, discover and learn new things, and experiment with different identities. Such a theory of motivation was supported by Ferguson and Olson (2013) with regards to child motivation for video game play. They found that children play games due to the fun and excitement factors associated with the game. They also play games with the hope of releasing their anger or frustration that relates as a form of escapism from the problems of the real world. Other factors that motivated gameplay in his study were socially related problems and boredom.

A synthesis of related studies reported in the literature has helped the researcher see that the motivation in gaming is categorised by several factors; the type of gamers, the type and design of the games, and the enjoyment element of a game. Understanding such factors may serve as an important guideline for the present study and as a stepping stone for a more comprehensive view of motivation in gaming. In addition to this, one of the most popular theories that is referred to in terms of players' enjoyment and intrinsic motivation is the flow theory.

2.5 The Flow Theory and Video Game Enjoyment

In the early 1970s, Mihaly Csikszentmihalyi posited that play is intrinsically rewarding. In this regard, he interviewed rock climbers, musicians, chess players, composers, sports persons, and musicians, in order to look into intrinsically rewarding experiences and therefore developed a theoretical framework called Flow. Flow provides a, "holistic sensation when we act with total involvement" (Csikszentmihalyi, 1975, p. 43). It has to be noted that the flow state occurs in the event of a balance being found between perceived challenges of a situation and a person's skills or capabilities for action. Csikszentmihalyi therefore specified eight major elements of the flow experience; challenge, immersion, control, concentration, clear goals, immediate feedback, loss of time and reduced sense of identity that is later reinforced. Table 2.1 summarises the elements of flow (Csikszentmihaly, 1990, as cited by Cowley, Charles, Black, & Hickey, 2008).

Some other scholars have extended Csikszentmihalyi's Flow Model to computer gaming. For instance, Cowley, Charles, Black, and Hickey (2008) studied different styles of mapping of flow onto gameplay and therefore concluded that the best way of understanding flow in video games is by building an information system framework that is based on the relationship identified between players and games by means of using the Cowley's user-system-experience (USE) model. In addition, Chen (2007) used the concept of flow to discuss the idea of Flow Zone, where a balance should be struck between the challenges of the activities and the abilities of the participants. He then designed a game design methodology, which is capable of providing different types of players with subconscious choices that would optimise video game experiences. Kiili (2005) studied the flow experience in the context of content creation challenges in

educational games. Inal and Cagiltay (2007) investigated the effects of the flow experiences on children in an interactive social game environment.

Table 2.1 Elements of Flow

Flow Elements
A challenging but tractable task to be completed
One is fully immersed in the task; no other concerns intrude
One feels fully in control
One has complete freedom to concentrate on the task
The task has clear unambiguous goals
One receives immediate feedback on actions
One become less conscious of the passage of time
Sense of identity lessens, but is afterward reinforced

From (Cowley, Charles, Black, & Hickey, 2008, p. 11)

The success of using the flow model in order to serve as a guide in a significant number of studies supports the effectiveness of using flow as a reference to measure gaming experiences. Many researchers have unanimously concluded that games need a balance of flow in order to reach satisfaction of gaming experience. In addition, Sweetser and Wyeth (2005) carried out a study that has helped define the elements that a game is required to have in order to provide flow. The GameFlow model is a model of enjoyment in games, which is constructed from a comprehensive review of literature looking into user experience in playing a game as well as its relationship with flow (Sweetser & Wyeth, 2005). The model consists of eight main elements: challenge, concentration, control, skills, feedback, clear goals, immersion, and social interaction. Every element has a variety of criteria that map onto Csikszentmihalyi elements of flow as it can be seen in Table 2.2.

Table 2.2 Mapping the elements from games literature to the elements of Flow

Games Literature	Flow
The Game	A task that can be completed
Concentration	Ability to concentrate on the task
Challenge Player Skills	Perceived skills should match challenges and both must exceed a certain threshold
Control	Allowed to exercise a sense of control over actions
Clear goals	The task has clear goals
Feedback	The task provides immediate feedback
Immersion	Deep but effortless involvement, reduced concern for self and sense of time

From: (Sweetser and Wyeth, 2005, p. 4)

It has to be noted that the elements of GameFlow are co-dependent with each other. In short, games should keep the players' concentration high towards the game and the tasks should be adequately challenging to be enjoyable. The balance identified between players' skills and the challenges of the tasks should be present with the task having clear goals for the player to complete. The player is required to receive immediate feedback on advancement with regards to completing the tasks. If the tasks have feedback and clear goals, and the player is adequately skilled, then he or she will have a feeling of control of the task. Another element is the feeling of total absorption or immersion for the players in the game that alters their sense of time, to lose concern for themselves, and consciousness of their daily lives. The last element, which is the social interaction, does not relate to the other elements of flow, although it is widely discussed in the literature on player-experience in the games. Individuals play games to interact with others, irrespective of the tasks, and will still play games that they do not enjoy (Sweetser and Wyeth, 2005).

The GameFlow model involves a goal (i.e., the element) and a collection of central criteria, which can be used to design and assess video games in terms of player's enjoyments concentration, the game must have activities that grab attention, must include

a balance between challenges and skills, and the players should not have any distractions from completing the tasks.

The element 'Challenge' was then argued to be the most significant characteristic in a good game design. For a game to be enjoyable, it must be adequately challenging, able to balance the skill level of the players, differ in degree of complexity, and maintain a suitable pace. In order to have the challenges and player skills to interact with each other, a game should therefore support player skill mastery and development. A player's skills should be able to match the challenge of the game. About the game, it has to be made interesting and its learning process should be fun. Throughout the stage of playing the game, the players should be able to improve their skills to truly enjoy the game. The manner in which players are trained to play a game is considered as vital to their enjoyment of the game and development of skills. In addition, it is also to allow the players to feel a sense of control over their activities of the game. Specifically, control in the games includes the ability of the players to take charge of their characters in the games, giving them freedom to explore the surroundings, and the ability to learn from errors. It is also important for the game controls to be made simple, fast and have adjustable settings for the buttons. The purpose is to make the players feel comfortable and efficient in the course of playing the game (Sweetser and Wyeth, 2005).

Goals of the games should be spelt out clearly to the players, which are sometimes explained by the storyline. In this regard, each level of the game must have several clear and straightforward aims to make a game enjoyable. Along with such clear goals, players also need to receive the right feedback at the right time. A clear response to gamers' action, progress, and status is important to maintain the interest of the gamers towards the game played (Sweetser and Wyeth, 2005).

A game that is both successful and enjoyable allows the gamers to have a feeling of deep immersion in the game. Being immersed in a game includes effortless participation in the game, less aware of time and the surroundings and the feeling of emotionally involved in the game. An additional element that is required to measure enjoyment in games is the social interaction. As many scholars have argued, a game should create opportunities and support the social interaction. Some gamers in some of the related studies reported that the support for competition, cooperation and interaction between gamers helps enhance the fun element in a game. The GameFlow model criteria is described in detail in Table 2.3, (Sweetser and Wyeth, 2005).

Table 2.3 GameFlow criteria for player enjoyment in games

Element	Criteria
Concentration Games should require concentration and the player should be able to concentrate on the game	▪ Games should provide a lot of stimuli from different sources ▪ Games must provide stimuli that are worth attending to ▪ Games should quickly grab the players' attention and maintain their focus throughout the game ▪ Players should not be burdened with tasks that do not feel important ▪ Games should have a high workload, while still being appropriate for the players' perceptual, cognitive, and memory limits ▪ Players should not be distracted from tasks that they want or need to concentrate on
Challenge Games should be sufficiently challenging and match the player's skill level	▪ Challenges in games must match the players' skill levels ▪ Games should provide different levels of challenge for different players ▪ The level of challenge should increase as the player progresses through the game and increases their skill level ▪ Games should provide new challenges at an appropriate pace

Element	Criteria
Player Skills Games must support player skill development and mastery	▪ Players should be able to start playing the game without reading the manual ▪ Learning the game should not be boring, but be part of the fun ▪ Games should include online help so players do not need to exit the game ▪ Players should be taught to play the game through tutorials or initial levels that feel like playing the game ▪ Games should increase the players' skills at an appropriate pace as they progress through the game ▪ Players should be rewarded appropriately for their effort and skill development ▪ Game interfaces and mechanics should be easy to learn and use
Control Players should feel a sense of control over their actions in the game	▪ Players should feel a sense of control over their characters or units and their movements and interactions in the game world ▪ Players should feel a sense of control over the game interface and input devices ▪ Players should feel a sense of control over the game shell (starting, stopping, saving, etc.) ▪ Players should not be able to make errors that are detrimental to the game and should be supported in recovering from errors ▪ Players should feel a sense of control and impact onto the game world (like their actions matter and they are shaping the game world) ▪ Players should feel a sense of control over the actions that they take and the strategies that they use and that they are free to play the game the way that they want (not simply discovering actions and strategies planned by the game developers)
Clear Goals Games should provide the player with clear goals at appropriate times	▪ Overriding goals should be clear and presented early ▪ Intermediate goals should be clear and presented at appropriate times
Feedback Players must receive appropriate feedback at appropriate times	▪ Players should receive feedback on progress towards their goals

Element	Criteria
	▪ Players should receive immediate feedback on their actions ▪ Players should always know their status or score
Immersion Players should experience deep but effortless involvement in the game	▪ Players should become less aware of their surroundings ▪ Players should become less self-aware and less worried about everyday life or self ▪ Players should experience an altered sense of time ▪ Players should feel emotionally involved in the game ▪ Players should feel viscerally involved in the game
Social Interaction Games should support and create opportunities for social interaction	▪ Games should support competition and cooperation between players ▪ Games should support social interaction between players (chat, etc.) ▪ Games should support social communities inside and outside the game

Adapted from (Sweetser and Wyeth, 2005, p. 5)

The GameFlow model was also considered as an acceptable guideline to help evaluate games and players' enjoyment, and it can also serve as a reference to look into players' intrinsic motivation (Fu, Su, & Yu, 2009). A review of studies has revealed that it was referred to by other researchers to evaluate players' enjoyment. Jegers (2007) outlined a new model called the Pervasive GameFlow model, which added extra elements into the criteria of GameFlow to evaluate players' enjoyment in pervasive gaming contexts. The pervasive model caters for three additional characteristics of pervasive gaming, namely mobile/place-independent gameplay, social interaction among players, and integrating physical and virtual worlds (Jegers, 2007).

Fu et al. (2009) designed a questionnaire based on the GameFlow elements, combining it with questions in relation to knowledge improvement to result in the EGameFlow model. The EGameFlow is used to evaluate learners' enjoyment in e-learning games. Chen's

(2007) attempts resulted in the Flow Zone based on GameFlow concepts. Particularly, the Flow Zone stated that there must be a balance between challenges and the players' abilities to face and solve the challenges. In the event of a challenge being beyond the skills, the activity will therefore be stressful, and if on the contrary the challenge is too easy, the activity will be a boring one.

However, Poels, Kort, and Ijsselsteijn, (2007) argued that despite the Flow being important to the game experience, its relation to game enjoyment may be restricted. In addition, they stated that the GameFlow study did not cover other famous games, and other experiences besides flow. They also argued that current game studies were not found to have considered the potential negative experiences in gaming such as frustration or tension, which can be added to the challenges and experiences of playing a game. They discovered that the motivation to play games is seen as a method of relaxation, and also as an opportunity to fill in free time. Moreover, it is also meant to overcome boredom or to relieve stress. Another motivation is in relation to social contexts such as spending time with friends to play games. Their study, which was a qualitative one also revealed that their participants reporting, "fun, amusement and relaxation is the most prominent game experience" (p. 117). According to the participants again, other experiences included immersion, feeling of control, concentration, tension, and social context.

Shafer, Carbonara, & Popova, (2011) designed a hypothesised model that incorporates several related factors in order to look into the level of enjoyment game players experience in the course of gaming. By means of using path analysis, the model was designed to examine the impact of spatial presence, perceived skills, perceived interactivity, and perceived reality of enjoyment. They also investigated the impact of gaming platform on players' perceptions of spatial presence, reality, and interactivity.

Perceived interactivity is considered as the degree to which a user states that he/she can participate actively in the game experience. In this regard, spatial presence is deemed the insight of virtual environments and objects; it is the intuition that nothing exists between the virtual world and oneself or the "non-mediation illusion of perceptivity." Lee (2004, p. 44). Spatial presence points to the fact that games live in the virtual surroundings and their consciousness of the real world is non-existence, and replaced with the virtual world. It has to be noted that the perceived reality is the measure of connection identified between the real world content and the media representation (Hall, 2003). Skill is widely deemed as the degree to which the video game player feels they have performed competently well while playing a particular game and indicates the players' post-gaming individual assessment of their performance in relation to the selected game; their perceived skill (Daniel M. Shafer, Carbonara, & Popova, 2011). The predictors discussed in the foregoing were hypothesised and proven to positively affect enjoyment in playing games. The predictors also were found to have affected each other.

In Shafer's (2013) paper entitled, *An Integrative Model of Predictors of Enjoyment in Consoles versus Mobile Video Games*, it was concluded that console games are capable of providing higher perceived interactivity and perceived reality. Besides, the results also showed that mobile games are enjoyable, realistic and presence-inducing but console games still have a higher impact. The participants of the study pointed out that the perceived interactivity and reality were found to be greater in the course of playing using higher technological platforms. The researcher therefore concluded that screen size and controller type may have shaped the results, however the study did not test this factor. They suggested that future studies should take such a factor into account. The present study focuses on the intrinsic motivation of gamers in the course of playing a game on different screen sizes. The flow theory was selected to be the theory to help determine

intrinsic motivation in completing a certain task. The GameFlow model has been referred to as a model that evaluates enjoyment in video games.

Another area of motivation in gaming that forms a focus of the present study is using video games in educational settings, especially in classroom environments. The next section therefore discusses the motivation of using games in education, the Malone and Lepper Intrinsic motivation taxonomy, and the potential of using consoles in education as well as in classrooms as an alternative teaching or learning method.

2.6 Games Motivation in Education

Games usually have a significant capability to help motivate people to acquire or learn something (Serrano, Rodríguez, Garzón, & Santamaría, 2009; Whitton, 2007). Video games have the potential to teach certain skills and therefore they can serve as a better method to encourage and engage learning for adolescents and children (Griffiths, 2002).

Alamri (2016) discovered video games cover a wide array of motivational categories, which include diversion, enjoyment, fantasy, interest with game, social interaction, excitement, relaxation, immersion, escapism and managing anger that are not available in traditional learning methods. Additionally, he stated that as a, “fun tool, video games may motivate students to be more collaborative, promote social learning, share information, and increase their achievements” (p. 24). Based on his comprehensive review, he therefore concluded that there are six advantages of integrating video games in the classroom settings, which are: video games can improve students’ motivation, can enhance student-centred strategies, can simplify science learning, can help students with

disabilities to better manage their behaviours, are a favourite technology at home and, video game environments can help provide safe learning environments.

Annetta (2008) stated that motivating students to learn can be more effective using games, especially involving passive students. The use of games as a training or learning tool may also be influenced by the changes observed in educational environments, which are more learner-centred mode of learning that encourages learning by doing (Garris, Ahlers, & Driskell, 2002).

Findley (2013) also summarised the findings from The Federation of American Scientist in the 2006 Summit of Educational Games, that video games have massive benefits in the field of education. In page 64, they listed down four points where video gamers can change learning by:

a) improving the speed at which developing expertise is acquired,

b) increasing the depth of understanding,

c) increasing the ability of the learners in transferring expertise to the solution of practical problems

d) increasing the level of motivation in learning, especially in terms of getting more time on a task (p. 64).

Whitton (2007) in his study proposed distinct ideas about employing games for intrinsically motivated learners pursuing higher education. He promulgated that the use of video games for educational purposes is due to the features being consistent with a constructivist learning environment; empirical, active, collaborative, problem-based, and established. “If a game is recognised as being the most applicable way to learn something hence students will be encouraged to make use of it to learn, not merely because it is a game” (p. 1066).

A synthesis of the findings of various studies revealed that video games can play an essential role in education and learning. Positive effects such as increased intrinsic motivation, positive attitudes of students, and independence in learning suggest that video games can be used as a technological tool in learning (Tüzün, Yılmaz-Soylu, Karakuş, İnal, & Kızılkaya, 2009). Attempts to better understand the motivational elements to employ games in educational settings may help in better implementations of this learning method.

2.6.1 Malone and Lepper's Taxonomy of Intrinsic Motivation for Learning

Malone and Lepper's taxonomy of intrinsic motivation for learning is one of the most referenced theories in the domain of attempting to measure and understand intrinsic motivation. T.W. Malone and Lepper (1987) designed a taxonomy of intrinsic motivation for learning based on the positive effects of using computer games. In this regard, the taxonomy is divided into individual factors (i.e., challenge, fantasy, curiosity, and control) and interpersonal factors (i.e., cooperation, competition, recognition). These factors are summarised in Table 2.4.

Table 2.4 Factors that promote intrinsic motivation **(**Malone and Lepper, 1987)

Factor	Description
Challenge	An activity is described to be challenging if the activity has an obtainable but uncertain goal. Goals should also be personally meaningful. The activity should provide performance feedback as enhance the self-esteem of the individual.
Curiosity	An individual should have a strong desire to explore, investigate and learn on the activity. Curiosity is separated in to sensory curiosity and cognitive curiosity. Sensory curiosity is stimulated by the change and attention towards light, sound or other stimulation that perceived by senses. Cognitive curiosity by making an individual wonder that their knowledge is lacking one or more this three characteristic; completeness, consistency and parsimony.

Factor	Description
Control	The activity evoked a sense of control to the individual. Giving the individual the choice on what and how they want to learn a certain task, making clear that the outcome of the task is controlled by the individual and the actions has "*powerful effects*".
Fantasy	Individuals would use mental image of things and situation that are not actually present to stimulate behaviour.
Competition	Individuals feel satisfaction by comparing their performance to others.
Cooperation	Individuals feel satisfaction by helping others achieving their goals.
Recognition	Individuals feel satisfaction when others recognise and appreciate their accomplishment.

Malone's intrinsic motivation has elements that relate to the factors, which promote intrinsic motivation in gaming environments. As it was discussed earlier in sections 2.4 and 2.5, the elements of control, challenge, social interaction, exploration and immersion interrelate with the point as it can be seen in Table 2.4. Thus, the combination of factors between intrinsic motivation in learning and in playing games can be integrated to better assess players' motivation. Moon and Beak (2009) referred to Malone and Lepper's theory and design elements that can be used to create educational games, especially to promote gamers' intrinsic motivation. In addition, they stated that the educational games may have to include Malone and Lepper's intrinsic motivation traits in order to maximise players' learning experiences. Table 2.5 shows a summarised version on the strategy to help enforce intrinsic motivation traits in players' learning and educational game design. In addition, Bostan (2009) also referred to Malone and Lepper's intrinsic motivation taxonomy, Sweetser and Wyeth Flow Model, Yee's motivation, and Murray's psychogenic needs theory in his attempt to create a taxonomy, which may help study the psychological effects of players' behaviour in gaming environments. It was summarised in the study that in designing a game that would maximise gamers' enjoyment, researchers and game designers must better understand gamers' motivations, users' preferences, play styles, and gamers' behaviours.

Table 2.5 Educational game design strategy for intrinsic motivation

Intrinsic motivation	**Variables**	**Specific strategy**
Challenge	▪ Goals ▪ Levels of difficulty ▪ Rules ▪ Score keeping ▪ Feedback ▪ Uncertainty	▪ Clear, proximal ▪ Coherence between learning goals ▪ Multiple level goals ▪ Optimal (intermediate)level, variable more specific ▪ Opportunity of success ▪ More advanced skill, immediate ▪ Always positive affective, no negative feelings ▪ Uncertain outcomes ▪ Hidden information and randomness
Curiosity	▪ Attention ▪ Sensory ▪ Cognitive	▪ Frequent alterations of the screen ▪ Sounds and graphics ▪ Novelty, incongruity, complexity, narrative, information
Control	▪ Choice ▪ Autonomy	▪ Richness of options ▪ Interest
Fantasy	▪ Intrinsic fantasy ▪ Cognitive fantasy ▪ Emotional fantasy	▪ Use of the skill ▪ Story ▪ Different kinds of fantasies to choice, individual identity

Adapted from: (Moon, & Beak, 2009, p. 721)

In another article entitled *Endogenous Fantasy and Learning in Digital Games*, Habgood, Ainsworth, and Benford (2005) made a different conclusion to the importance of fantasy. They concluded that endogenous fantasy is not a significant factor to improve learning by means of using educational video games. However, intrinsic motivation and learning using games were more affected by the elements of flow, representations and game mechanics. They further stated that even though the experiment carried out in their study did not show a strong significance to endogenous fantasy, “this does not mean that the motivational power of fantasy is not a significant factor in making an educationally effective computer game and it should not detract from the value of the motivational taxonomy” (p. 496). In another ethnographic study which looked into a multiplayer online educational game, there were 13 motivational elements identified for learning, which

included identity presentation, social interaction, playing, learning, ownership and control, fantasy, immersive context, curiosity, creativity, achievement, rewards, uniqueness, and context of support (Tüzün, 2004). One assertion in Tüzün's work is that, putting together the use of playing and learning resulted in a strong motivator for the students and a balance in both should still be observed.

Gamers learn how to progress in games while playing and studying with appropriate individual development level and skills. It may be beneficial for educational games to incorporate the intrinsic motivational factors (i.e. curiosity, challenge, fantasy, and control) to enhance players' learning. Upon reviewing the literature, I can summarise that educational games can be beneficial in education if they are designed with learning and intrinsic motivation factors.

2.7 The Background Summary on Game Console and Screen Size Evolution

Over the past 30 years, screen sizes and video games have changed significantly. Such an evolution began with the Cathode Ray Tube (CRT) television, which powered most of the home consoles from the third generation of consoles straight to the sixth generation of consoles. The main console of the third generation or the 8-bit is the Nintendo Entertainment System (NES). The hardware of the NES made it possible to display 16 colours on a standard CRT television (Turner & Nutt, 2009). In the year of 1987, the cost of designing new hardware has become much more affordable and console manufacturers therefore looked for the next big thing in their attempts to attract consumers. Nintendo released the Super Nintendo Entertainment System (SNES) with a 16-bit graphics processor chip. Specifically, the 16-bit chip is capable of generating up to 256 colours up to several different graphics modes (Pipegrass, 1998). Such a feature has enabled the

SNES to display 3D graphics on certain type of games. Games such as F-Zero, Donkey Kong Country and Super Mario Land widely use the Mode 7 3D graphics. The SNES uses Red, Green and Blue (RGB) composite cables in order to generate 16-bit palette colours on a CRT screen.

During the 1990s, arcade hardware was found to have been widely surpassing home consoles due to the fact that arcade cabinets had 3D video card accelerators. Boards like the Capcom CP System III, Sega Model 3 and Namco System 12 are capable of displaying 3D graphics on a flat screen. As a result of this, arcades in the early 1990s became a popular hangout joint among the gamers (June, 2013), and more console manufactures kept researching about newer and better ways to help display graphics that may make the audience more immersed. Between the years of 1994 and 1996, the three major console manufactures released the Sony PlayStation, the Sega Saturn, and the Nintendo 64. While the PlayStation and the Saturn both used Compact Disc or CD-ROM as mediums of distributing their games, Nintendo however opted to stick to the cartridge format. CD-ROM however was deemed to store more information, thus producing better 3D graphics (Holland, 2015). At this point in time, companies were still researching better display technologies. Plasma and LCD screens were already made available commercially but due to the relatively higher cost of manufacturing, most consumers could not really afford it (Castellano, 2005). Such circumstances led to the fifth generation consoles being designed with composite cables for display on CRT televisions.

It was not until the sixth generation of consoles that the consumers observed changes in the current hardware that was used to display games with the release of the PlayStation 2 and Microsoft Xbox. Each console came with different display inputs such as component, S-Video, and composite. By means of using composite cables, consoles are capable of

offering a relatively higher resolution of display and therefore it would make the graphics smooth and more detailed. The seventh generation of video games began in the year of 2005 when Microsoft Corp. introduced the Xbox 360 into the market. It was immediately followed by Sony and Nintendo, which introduced the PS3 and Wii respectively. It was in this era that the consumer televisions became more affordable due to the fact that the cost of manufacturing the sets had become cheaper over time (Martin, 2011) with High-Definition Multimedia Interface (HDMI) outputs becoming standard in all televisions sets.

The PS3 and Xbox 360 have built-in HDMI inputs within their machines. These consoles are capable of projecting graphics up to 1080p, which is the highest quality of graphics at that point in time (Sony Computer Entertainment Inc., 2016). The Wii however had composite input, which can only give a graphics settings of up to 480p. The screen sizes for home consoles are mostly subjective and dependant on the current screen size preferred by the consumers (Nintendo, 2012). An LCD or LED television set may range from the smallest size, which is around 17 to 19 inch right up to the biggest size that may range around 55 to 60 inches. Each of the screen resolutions reportedly has different effects on different screen sizes. A normal viewer may only observe a graphic difference if a lower resolution is used on a bigger screen. On a smaller screen, it can be harder to observe the differences unless they concentrate on a particular area on the screen. Screen sizes play a significant role in multiplayer split screen. In the course of a split screen play, each individual player will get their own screen. This is achieved by splitting the main screen into four smaller parts for each player to have his or her own viewing point. As a result of this, players with relatively larger television sets stand to benefit from the split screen play rather than the players with just smaller television sets.

The display for handheld consoles has also changed tremendously throughout the years. There are a couple factors that have widely contributed to the size of the handheld consoles. Among them are technology, power, and cost. These three factors were interrelated to the extent of determining a handheld longevity and effectiveness on the market among gamers. It began with the Nintendo Game Boy in the year of 1989, which sold 118.69 million units since its launch (Statista, 2015). The Nintendo Game Boy display is made with a reflective super-twisted nematic display (STN) LCD. The STN display is a type of monochromatic LCD. In other words, it uses less power to display images with a viewing size of 160 x 144 pixels (Nintendo, 2016). The graphics on the Game Boy are small sprites on the screen. Since the screen resolution is quite small, the amount of items that can be displayed at a certain time on the screen is rather limited. The Game Boy however does have limitations that it can only display four shades of green and it has no backlight, which means that games cannot be played in the dark. Sega realized this as an opportunity and therefore released a competitor to the Game Boy, which they called the Sega Game Gear.

The Game Gear was shipped with a backlit 3.2-inch colour LCD display, which is capable of displaying 32 colours on the screen (MacDonald, 2002). However, even with the superior hardware, the Game Gear only managed to sell 11 million units as it requires 6 AA batteries to power the system for 3 hours in comparison with the Game Boy's 30 hour battery life with only 4 AA batteries. Such a development marked the end of Sega's entrance into the handheld market.

In the year of 2001, Nintendo planned to release a new Game Boy with better specifications and hardware, which resulted in the Nintendo Game Boy Advance. The Game Boy Advance (GBA) comes with a 2.9 inches TFT screen, which is capable of

displaying 511 colours out of a 32000 colour palette (Nintendo, 2000). Nintendo released an updated version of the Game Boy Advance, which is called as the Game Boy Advance SP with enhancements like a Lithium-Ion battery and a backlight for the screen. Since the GBA physical disc is less than 1MB in size, the graphics that are able to be displayed are still 2D sprites but the colours are more vibrant and there are more moving items found on the screen.

In the year of 2004, Nintendo had an impact on the handheld market by releasing the Nintendo DS. The DS became Nintendo's most profitable machine as they sold more than 153 million units by the year of 2014 (Statista, 2015). The DS was considered as different as any other handheld devices on the market because it had two 3 inch TFT display screens at the top and bottom of the handheld. It is worthy of note that the DS is capable of displaying 262,144 colours on screen with the top screen displaying 3D graphics and the bottom touch screen only can show 2D graphics like maps (Console Database, 2005). The DS can offer the players a more immersive experience since it has built-in Wi-Fi for multiplayer matches. Besides, the second screen serves to function like an inventory menu or map chart that is capable of offering the players split second decisions while playing.

While in the case of the present study, the Nintendo DS is used as the main testing equipment, the technology of handheld devices continues to evolve over time. As many would attest, Sony became the main competitor to Nintendo by releasing the PlayStation Portable (PSP) in the year of 2004 to cater for the hardcore gamers. The PSP offers a single screen 16:9 inch TFT LCD display capable of displaying graphics higher than the PlayStation 1. Sales of the units were good at 80 million units being sold but it is still unable to beat the popularity of the DS (Statista, 2015). The current generation of handheld games is seen as a duel between the Nintendo 3DS and the PlayStation Vita.

The 3DS is a revision of the DS but it is capable of displaying actual 3D graphics without using 3D glasses (Nintendo, 2013) while the PlayStation Vita (PSV) is a hardware haven with regards to the handheld devices since it has an organic light-emitting diodes (OLED) screen that is capable of shedding bright and crisp graphics to the end user (Nikkei Technology, 2011). While both consoles use touch screen controls as one of their inputs, the 3DS have managed to beat the PSV in relation to sales, which resulted from a wide selection of games.

In conclusion, based on the evolution of games technology, the screen sizes and screen type play significant roles in the evolution of game consoles. Selecting the right consoles and screen sizes might influence gamers' experiences and motivations in order to play or purchase a game. In order to understand the influence of screen size on the audience and gamers, the next section of this chapter discusses the related studies of screen size and its impact on gaming.

2.8 Studies on Screen Size and Gaming

Questions such as "Which is better, a bigger screen or smaller screen?" have widely been discussed in a number of forums in the event of considering to purchase a television screen or monitor for entertainment, particularly gaming. Some examples of the forums are; 1) Gears of War Judgement Forum (thread: Large screen vs. small screen)[1], 2) Digital Spy, DS Forum (thread: Large screen vs. small screen)[2], 3) IGN Forum (thread: Bigger the better (Monitor)[3], 4) StackExchange (thread: Would using a smaller screen help me play F-PS better?)[4], and 5) The TechGame (thread: Do you prefer big or small screen for

[1] https://forums.epicgames.com/threads/769903-playing-on-a-big-screen-vs-small
[2] http://forums.digitalspy.co.uk/showthread.php?t=1786798
[3] http://gaming.stackexchange.com/questions/27143/would-using-a-smaller-screen-help-me-play-first-person-shooters-better
[4] http://www.thetechgame.com/Archives/t=3949811/do-you-prefer-big-or-small-screen-for-gaming.html

gaming)[5]. Upon analysing the discussion, it was learnt that many were saying that bigger is better. Although, others were saying that a smaller screen is capable of providing focus and concentration. In addition, some answered that it depended on the usage, and a small screen might not be considered as suitable for the first person shooter game but acceptable for puzzle games.

It has been learnt through related studies that screen size exerts influences on audience's viewing experience in terms of arousal, enjoyment of the media, and positive media experiences. More specifically, the screen size may affect audience's feelings, emotions, and enjoyment on the video being shown (Grabe, Lombard Reich, Bracken & Ditton 1999; Lombard, Ditton, Grabe & Reich 1997). Grabe, Lombard Reich, Bracken & Ditton (1999) also stated that, "there is substantial evidence for the idea that larger screens promote perceived realism of media content and perceptions of presence" (p.5).

In relation to gaming, Hou, Nam, Peng, and Lee (2012) stated that a larger screen size may have a greater impact on the players' sense of physical and self-presence. Players significantly relate more to the characters identified in the game in the course of playing on a bigger screen size. Their study concluded that players enjoyed a game more in the event of playing on a large screen. The larger screen affects the emotional and behavioural responses of the players. However, they summarised that the impact of large screen on players' enjoyment and immersion still remains unclear. They also argued that the characteristics such as domain-specific knowledge, introversion and extroversion, psychological factors, and demographic differences may equally affect the experiences

[5]http://www.thetechgame.com/Archives/t=3949811/do-you-prefer-big-or-small-screen-for-gaming.html

of virtual environment and therefore, they need to be considered by researchers for future works.

Kim and Sundar (2013) looked into the contribution of controller type and screen size to users' aggression levels in the event of playing violent games. Therefore, the researchers concentrated on the effects of realistic controllers (e.g. driving wheel, gun replica for shooting games or the WiiMote) on presence and arousal, the effects of large screen display on presence and arousal, and the effects of presence and arousal on aggression. Their findings revealed that playing violent games on a large screen size and using a realistic controller type is capable of providing a higher sense of presence in comparison with playing with a mouse or on a relatively smaller screen. Ivory and Magee (2009) looked into the effects of physiological arousal and flow experience between television based consoles and the portable ones. They discovered that even though portable consoles are undeniably popular and convenient, they may still affect the users' experiences. In addition, their study also stated that portable consoles resulted in lower physiological responses and flow experiences. In this regard, they suggested that due to some limitations of their research, an alternative method for studying the effects of portable consoles, particularly the flow experience should be considered in future studies.

Although big screens are generally preferred, there is still considerably high demand for small-screen devices. The preference for handheld consoles is still discussed in magazines and online forums. It was discovered through a recent online news article written by Rik Henderson (2015) titled '6 reasons why handheld games consoles are still a thing', that the navigation controls (physical buttons and thumbsticks), the dedicated hardware (graphic chips, screens), the games dedicated for the handheld consoles, the free applications, the back catalogue and also Nintendo's active development of games and

game technology are among the reasons for handheld consoles being still a common choice for gaming purposes.[6] Furthermore, some of the widely discussed topics are the potential of consoles and handheld consoles for educational purposes, especially in the classroom environments.

2.9 Educational Use of Consoles in Classrooms

The possibility of using console games to serve as a tool for teaching and learning in classroom settings has widely been discussed by researchers. It has to be noted that console games and video games are prevalent mostly among the young. In this regard, a study carried out for future lab indicated that 79% of 737 children between ages of five and fifteen played computer games 'a few times a week' at home alone (Jen Groff, Cathrin Howells, & Cranmer, 2010; Ulicsak, 2010).

A significant number of researchers (Bourgonjon, De Grove, De Smet, Van Looy, Soetaert, & Valcke, 2013; Jen Groff, Cathrin Howells, & Cranmer, 2010)) have unanimously argued that there are various educational benefits resulting from playing console games in classroom settings and, unofficially, at home. Other than being seen as a good motivation tool for children, video games have enabled hand-eye coordination, reaction time, self-esteem, communication skills, and collaboration skills (Serrano et al., 2009). Students have mostly believed that using video games in classroom settings can offer learning opportunities, it is a motivational learning tool, it is engaging, and it is a lot of fun (Alamri, 2016, Bourgonjon et al., 2013; Annetta, Minogue, Holmes, & Cheng, 2009; Pulman, 2007; Ruggiero, 2013, Tüzün 2009). Teachers have equally found that the use of games is considered as beneficial as it is also motivational and immersive.

[6]Rik Henderson (2015). 6 reasons why handheld games consoles are still a thing. Pocket.lint. Retrieved on 25 March 2016 from http://www.pocket-lint.com/news/132626-6-great-reasons-why-handheld-games-consoles-are-still-a-thing.

However, the topics and the contents of the classroom lessons must be ensured as suitable. It is worthy of note that video games can be useful as either rewards or used as an assistive tool rather than being considered as the main instructional tool (Ruggiero, 2013). Most of the studies in the area of education have obviously looked into console games such as the Nintendo Wii, the PlayStation, or the Xbox. Moreover, some studies have looked into online games or computer games. Such games are usually played either on a computer or television screen. Notwithstanding the potential, there are however challenges in the event of using game consoles as learning tools, as it may require a lot of space to be set up and play the console and it could also be distracting to other students (Groff & Howells, 2012). Handheld consoles might be a solution to the challenges presented by other consoles.

Nowadays, handheld small screen consoles are capable of performing almost everything that a PC can accomplish. The word “mobile devices” is mostly operationalized as laptops, handheld video gaming consoles, smart phones, and tablets. The creation of handheld consoles such as Nintendo DS (Dual Screen) and the Sony’s PlayStation Portables has opened up new vista on using these devices as learning tools. In this regard, Evans (2006) cited by Pulman (2007) outlined a few benefits of using mobile devices in learning experiences. Such benefits include: a) privacy, a handheld console could provide learners with a more private and personal learning environment, b) immersive, a handheld console game is also capable of offering an immersive learning experience through its content, and c) user control and flexibility, users have full control over the place and time that they choose to learn. Among the other benefits include: 1) lower cost, a mobile console is considered affordable for individuals or schools to purchase compared to the normal consoles, 2) portability and size, a mobile console is relatively smaller therefore easy to carry it everywhere; students will be able to use it at home for practice or

homework, 3) Sociability, the mobile console games are connected to Wi-Fi therefore it can encourage collaborative learning activities and friendships, and 4) Usability – most mobile consoles are easy to use (e.g. stylus or touch screen as an input too) (Miller & Robertson, in press; Morgan, Butler, & Power, 2007; Pulman, 2007).

The use of handheld consoles has also been actively proposed by various scholars to be used in the classroom environments as a learning tool. For instance, in Japan and Iran, the Nintendo DS and the PSP are suggested as tools to learn or teach basic English skills (Kane, 2007; Shirali-Shahreza, 2008). In this regard, Rapeepisarn, Pongphankae, Wong, and Fung (2008) proposed a conceptual model for the preparation of using handheld games in the classrooms of a higher learning institution. Specifically, they discussed that the potential of using handheld learning consoles in classroom environments is capable of offering beneficial motivation for young adult learners.

2.10 Summary of Literature Review

The literature in this thesis discussed prior work. Related previous studies and the theoretical underpinnings in relation to motivation, intrinsic motivation, and flow theories were comprehensively reviewed in this chapter. However, the focus was on the intrinsic motivation of playing video games and the influence of screen size on the audience and the gaming itself. Besides, the potential and motivation of using video games and consoles in education was also described.

Various aspects such as enjoyment, fun, game design, and social interaction were reported in related studies to have encouraged gaming. In addition, some of these studies have compared the uses of consoles type in relation to the enjoyment as a result of playing.

Notwithstanding, a gap has been identified with regards to a better understanding of the intrinsic motivation of gamers in the course of playing games on certain screen sizes. Most of the studies have widely focused on games using computers and consoles (Nintendo Wii and Sony PlayStation). Despite the possibility of yielding different findings, the study on handheld console is still a significant area to explore. Moreover, the use of consoles (on big screens or handheld) in classrooms has also been discussed in the education field, for which it has been argued that they are beneficial to learners provided that a balance can be found between gaming and learning. Taking such developments into consideration, an additional study on the understanding of gamer's intrinsic motivation by looking at the differences or similarities of gamers' behaviours in the course of playing games on different screen sizes could be beneficial to educators, game designers, and future researchers of motivational studies.

In terms of the methodology employed, some researchers relied on the GameFlow model as a guide to help them measure game enjoyment and most of such studies employed a quantitative approach to collect data. Alternatively, some other scholars have promulgated employing a qualitative or an interpretive research method to investigate the gamers' intrinsic motivation. In this regard, they argued that such an approach may produce varying results and outputs in the area of gaming. In the case of the present study, it employed an ethnographically-informed method in measuring gamers' intrinsic motivation in the course of playing game on different screen sizes. It has to be noted that the results of the study were analysed inductively. Upon analysing the data thematically, all themes were grouped and the Game Flow theory was referred to, and the results were mapped onto some of the Game Flow theory elements. A more detailed explanation of the research design will be provided in the following chapter.

3. RESEARCH DESIGN

3.1 Introduction to research approach.

This chapter outlines the research approach of this study, which is interpretive research. In order to understand the methodology selected for this study (i.e. ethnographically informed) and the reason for its suitability for gaming research, this chapter will begin by explaining the meaning of culture and how video gaming is viewed from a cultural point of view. Related studies are then reviewed; taking into consideration the suggested areas on researching gaming culture that should be looked into. Apart from that, this chapter also highlights the use of ethnographic methods to study video games, which are derived from the recommendation from the literature. Moving on, a brief background on ethnography and an explanation on the term 'ethnographically-informed' and how it relates to this study are also elaborated. This chapter continues with the discussion on the challenges of ethnography and a brief conclusion on the methodology of the present study. Finally, the explanation of the research design for this study, which includes the simulated gaming environment (SGE), the game, genre, consoles, participants' recruitment and the data collection process are deliberated.

3.1.1 Background on Qualitative Research: Interpretive Research

> Qualitative research is an interdisciplinary, trans-disciplinary and sometime counter disciplinary field. It is committed to the naturalistic perspective, and to the interpretive understanding of human experience. Qualitative researchers, stress the socially constructed nature of reality, the intimate relationship between the researcher and what is studied. (Denzin & Lincoln, 1994, p. 4)

It is worth highlighting that qualitative research allows the participants to express their feelings and behave naturally as if they are not in a research environment. Qualitative

research is by nature open-ended and designed to lead the researcher into unplanned areas of discovery within the lives of the people, society and culture that is being investigated (Holliday, 2007).

The two prominent approaches in qualitative research are positivist and interpretive research. The positivist approach refers to research, which is done with an objective in mind and is usually based on a pre-existing theory to verify the requirements of the study. Positivism relies on translating qualitative data into quantifiable data and variables, and does not attempt to interfere with the phenomena being studied. It is usually undertaken to test a theory or hypothesis (Kura & Sulaiman, 2012; Myers, 1997). Interpretive approach, on the other hand, is research carried out through a socially constructed reality. It helps researchers understand the human and social aspect of the study. It relies on qualitative data and commonly; the researcher is involved and has direct access to the people, issues and data (Myers, 1997; Walsham, 2006). Positivist research results are usually predefined and confirmation of the results is from the structured research data, centred around the specific predefined question. However, in interpretivist research the results are developed inductively through data that is collected through direct contact with humans or/and artefacts (Trauth & Jessup, 2000). Trauth and Jessup's (2000) *Understanding Computer Mediated Discussion: Positivist And Interpretive Analysis Of Group Support System* used both positivist and interpretive analysis and concluded that results that emerged from positivist analysis was, "the conclusion of effective group directed towards consensus around alternative solution scenarios" and results that emerged from interpretive analysis was "evidence of multiple, rich types of information: cognitive, affective and behavioural" (p. 43). A comparison of these two approaches is illustrated in Table 3.1.

Table 3.1 Comparison between Positivist Approach and Interpretive Approach

Positivist Approach	**Interpretive Approach**
Reality is objectively given	Reality is socially constructed
Analyse phenomena in terms of variables	Analyse phenomena in terms of issues, focuses on human sense as situation emerges
Relies on quantifiable and measured data	Relies on qualitative data from social constructions (human behaviour, language, dialogue, documents, artefacts and other tools)
Start with a theory or hypotheses and then test them	Develop ideas through induction from data
Focus on facts	Focus on meanings
Observer is independent and does not get involve with the participants	Observer is part of the observed
Usually involve large samples	Use small samples that is investigated in-depth or over time
Use mostly quantitative research methods (surveys, case studies, causal comparative studies, correlational studies,)	Prefer qualitative research methods (grounded theory, ethnography, phenomenology)

Adapted: (Easterby-Smith, Thorpe, & Lowe, 2002, p. 30; Klein & Myers, 1999; Myers, 1997; Walsham, 2006)

Table 3.1 shows that interpretive research focuses more on managing data in an inductive approach and relies on qualitative data from social constructions. Furthermore, it requires more in-depth involvement from the researcher and focuses on meaning and human senses. In contrast, the positivist approach relies on quantifiable and measured data, focuses more on testing theories and hypothesis, as well as facts and objectivity

At the beginning of this study, I could not find any theory looking into motivation and screen sizes and there were no related theories to test, hence the reason for not employing a positivist approach. My decision to employ interpretive approach was further strengthened by the description from Klein and Myers (1999) that “research can be identified as interpretive if the knowledge is gained through social construction such as

language, consciousness, shared meanings, documents, tools and other artefacts" (p. 69). In this study, I believed that the best path was to obtain knowledge from gamers (society, language, and consciousness), and from information on games, genre and screen sizes (tools and other artefacts). With this in mind, I deemed it is best to observe the participants in a way that encouraged them to feel comfortable, and in which they could express themselves honestly. This is possible if the research method is qualitative and interpretive. As stated by Myers (1997), qualitative research is motivated by the fact that humans have the ability to express their opinion and feelings towards a particular subject matter.

Reviewing the literature, it was found that ethnographic studies in gaming research are beneficial in studying gaming culture and gaming behaviour. This is highlighted in the next section (section 3.1.2) and justifies my reasons for selecting the interpretive approach and ethnographically informed method.

3.1.2 Choosing the research method: Ethnography

Ethnography is a research method employed by researchers to capture an understanding of people's feelings, behaviour and opinions by means of being close to the subjects and getting immersed in the study. It allows the researcher to gain a deep understanding of the people, their culture, the organisation and the wider context within which they work. Ethnography relies heavily on up-close, personal experience and possibly participating in the research and not just doing observation (Brewer, 2000; Genzuk, 1999; Myers, 1999).

In his famous 1871 definition, Edward B. Tylor, a founding figure in anthropology, defined culture as "that complex whole which includes knowledge, belief, art, morals,

law, custom, and any other capabilities and habits acquired by man as a member of society" (Tylor, 1958, p. 1, as cited by Boellstorff, 2006). In qualitative research, the concept of culture refers to, "cohesive behaviour within any social grouping from a neighbourhood to a work group" (Holliday, 2007, p. 12). Furthermore, Murchison (2010) stated that the most suitable method to understand culture is by using ethnography.

Culture is defined as a group of people having cohesive interest and thus, it cannot be denied that video games have become a part of culture. Video games have been embedded as normality in society since they are not only played by children or teenagers but have been used by people in many disciplines such as entertainment, health, and education. Yates and Littleton (1999) highlighted the importance of viewing computer gaming from a social and cultural perspective. Multiplayer games such as Mario Party, racing games or shooting games can create a social environment of excitement, competitiveness and teamwork. Multiplayer online games construct networks of gamers throughout the world where strangers can become allies and may continue as friends. The creation of portable devices such as Nintendo DS and the PSP for individual gaming supports network play and are becoming social events. These factors represent a new culture of the gaming world.

Several studies have highlighted the importance of understanding and studying the gaming culture by looking at the gamers and their experience. This is beneficial in understanding the impact of games, game aesthetics, gameplay, as well as the construction of methodology in studying games (Aarseth, 2003; Lammes, 2007; Steinkuehler, 2006). Boellstorff (2006) claims that anthropology helps in understanding the games cultures, social behaviour in gaming and discusses the use of participant observation for investigating games and culture.

Shaw (2010) examined video game cultures in both press and academic articles critically and revealed that video game cultures can be defined and studied in three categories: (a) who plays the video game, (b) how they play, and (c) what they play. She concluded that "video game studies should be reflexive, not reactive; we should look at video games in culture rather than games as culture" (pp. 416 -418). She also states that "it is as important to investigate how video game culture is constructed as it is to study the culture in games. This is a critical, not descriptive practice" (Shaw, 2010, p. 418).

Numerous studies have used ethnography as a research method to understand gaming culture and gaming behaviour (Ducheneaut & Moore, 2005; Fields and Kafai; 2010; Wang & Mainwaring, 2008). Fields and Kafai (2010) studied the insider gaming and found that two groups of studies employed different approaches, in which ethnography was used to study the virtual world. The first group employed ethnography together with their own learning experiences and reflection to study online play in particular the social, economic and cultural practices in the virtual world. The second group used observational methods supported by video recording and ethnographic notes to capture the physical environment of online gaming, which is mostly in gaming clubs and Internet cafes. The main focus of this research is to capture conversations and interaction among participants in the physical space during online gaming. Other researchers employed ethnography to understand the social aspect of gaming, particularly in multiplayer online gaming and education (Ducheneaut & Moore, 2005; Wang & Mainwaring, 2008).

Most of the data gathering methods used to apply the GameFlow model in game evaluation have been by the means of expert reviews and questionnaires (Fu, Su, & Yu, 2009; Sweetser & Wyeth, 2005). Their literature recommends that future work to measure

players' enjoyment should be done by means of using observation or play-testing when using the GameFlow model (Fu, Su, & Yu, 2009; Sweetser & Wyeth, 2005).

Ivory and Magee (2009) studied the effect of physiological arousal and flow experience between television based consoles and portable consoles. They found that even though portable consoles are undeniably popular and convenient, they may affect users' experience. Moreover, their study indicated that portable consoles result in lower physiological responses and flow experience. They suggested that due to some limitation to their research (using a factorial designed experiment), an alternative method on studying the effects of portable consoles, particularly that of the flow experience should be continued in future research.

Upon reviewing the literature, it can be concluded that ethnographically informed method is the most suitable approach that can be employed to answer the research questions of the present study. Data for this study will come from participant observation, interviews and personal experience to learn the motivation and behaviour of gamers while playing a particular game on two different screen sizes.

3.1.3 Characteristic of Ethnographic Research[7]

Ethnography allows first-hand involvement with the gamers not just by observing but also joining in the game sessions. Researchers are able to understand the emotional experience and the gamers' rituals and cultures by means of interviews and observation

[7] This section has been substantively published in Zainal Abidin, N. F., & Wellington, R. J. (2011). *Simulated Gaming Environment for Ethnography Research.* Paper presented at the Proceedings of the 4th Annual International Conference on Computer Games, Multimedia and Allied Technology, Penang, Malaysia. As well as in Zainal Abidin, N. F., & Wellington, R. J. (2014). The Usefulness of a Simulated Environment in Ethnographic Research for Gaming and HCI. *GSTF Journal on Computing, 1*(4).

(Fetterman, 1998). Myers (1999) pointed out that researchers develop an intimate familiarity with the dilemmas, frustration, routines, relationship and risks involves in the study by participating in the research. Figure 3-1 summarises the characteristic of ethnography as a method.

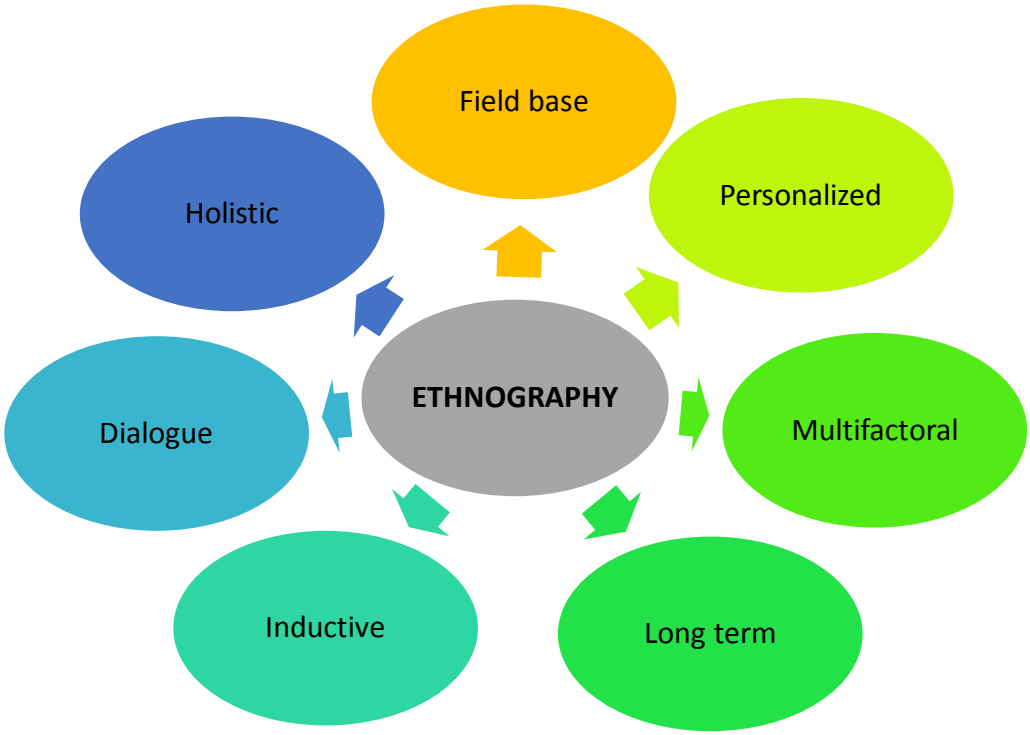


Figure 3-1 Ethnography as a method. (Angrosino, 2007, p. 15)

Genzuk (1999) in his article entitled *A Synthesis of Ethnographic Research* elucidates three methodological principles of using ethnography in a research. The principles include:

a) Naturalism

Ethnographers aim to capture the character of naturally occurring human behaviour in their own comfort zone. The principal idea of naturalism is to make sure that the people being studied feel comfortable and are not affected by the research method or the researcher. The aim is to increase the chances of generalisation on what is discovered in

the settings to similar settings that have not been researched. In this study, this is achieved by conducting the study in a simulated gaming environment, which was designed to be a natural gaming environment.

b) Understanding

"Ethnography is the art and science of describing group or culture, it may be of a small tribal group in an exotic land or a classroom in middle-class suburbia" (Fetterman, 1998, p. 1). It is of utmost importance to gain the understanding of cultural perspectives on which they are based in explaining human actions. Also, it is essential to learn and understand the culture of the group before one can produce valid explanations for the behaviour of its members. In the present study, I ensure that as a research instrument, I am sensitive to the culture being studied.

c) Discovery

The concept of ethnography is that the research process is an inductive or discovery based research. The idea is that ethnography study enables researchers to discover new insights or information that is not tied to a set of hypotheses. The theoretical ideas are developed over the course of the research through observation, documentation of the research and are not influenced by a precondition. In this study, the analysis of the data was undertaken inductively in order to achieve the derived theory.

3.1.4 Understanding Ethnographically-Informed in Computer Studies.

The use of ethnography in information systems studies has offered an encouraging method in studying the usability of systems, better understanding on human, social and organisational aspect of information systems to researchers (Myers, 1999).

> The turn to ethnography is a response to the need for an adequate understanding of the nature of work to underpin the construction of interactive systems. It is also increasingly accepted within the software engineering community that understanding the "social" real world is an important factor in software design. (Hughes, King, Rodden, & Andersen, 1995, p. 57)

As regards computer studies, such as human computer interactions, software design and interface design, ethnographically-informed approach have been employed. An ethnographically-informed approach follows most of the traditional characteristics of ethnography, but it might be completed in a shorter time frame or more informed settings. It is revealed in the literature that, an ethnographically-informed approach to study gaming or software practices is a suitable option to conduct shorter research while still adapting the classical ethnographic method to answer the research question. (Millen, 2000; Robinson, Segal, & Sharp, 2007; Viller, & Sommerville, 2000).

There are several ethnographically-informed methods (refer to Table 3.2) in human computer interaction, which are utilised to evaluate software design, interface design, or a system that can be referred to as a guide when doing research on gaming experiences and screen sizes.

Table 3.2 Ethnographic methods

Method	**Description**	**Reference**
Concurrent Ethnography	Ethnography study take place concurrently with the system design. The result of the study is usually referred to refine the prototype developed	(Burke & Kirk, 2001; Hughes, King, Rodden, & Andersen, 1994)
Quick and Dirty Method	Ethnography study carried out to provide a broad but informed sense of the setting for designers. It is usually completed during a limited time frame and/or with a small budget.	(Burke & Kirk, 2001; Hughes, King, Rodden, & Andersen, 1994).
Evaluative Ethnography	Ethnography study is employed to evaluate a new design model. It helps to confirm or validate a new design model or theory.	(Burke & Kirk, 2001; Hughes et al., 1994)

Method	Description	Reference
Rapid Ethnography	Ethnography study that uses a collection of field methods intended to gain an understanding on the users and their activities. It is usually done when a significant time pressure is given and limited time in the field.	(Burke & Kirk, 2001; Millen, 2000)
Re-examining Previous Studies	Ethnography study that re-examine and review previous studies in many other areas to get initial design ideas.	(Burke & Kirk, 2001; Hughes et al., 1994)

In the present study, evaluative ethnography is considered the ethnographically-informed method that is related to studying screen sizes and gaming behaviour. It is suitable for this study due to the fact that evaluative ethnography is usually used in a "restricted domain and a relatively short time period" (Burke & Kirk, 2001). For instance, an evaluative ethnographic research study was conducted in the study of virtual environments (VE). It was suggested that when designing a VE, a clear study on the participants would be beneficial and should begin at an early stage of the design process (Crabtree et al., 1999 as cited by Gouveia & Gouveia, 2002).

Another evaluative ethnographic study was carried out by Gouveia & Gouveia (2002). They examined the use of evaluative ethnography for design practices, which focuses on a visualisation design for sharing knowledge (ViDESK). The results from the ethnographic approach and quantitative research enabled them to reach to a number of useful conclusions and they were able to access the system and list a number of design requirements. Lehmann, Freedman, Massad, & Dintzis (1999) carried out another research study using a controlled experiment. They evaluated the effects of integrating a computer-based atlas in their laboratory courses. In this controlled environment, they incorporated an ethnographer to observe and record the data to answer their hypothesis regarding students' interactivity, attendance, satisfaction, as well as instructors and students' productivity. Through the combination of structured observation and self-

reporting in a factorial controlled study, they gained valuable data on the usability of the computer-based atlas. These two studies employed a combination of quantitative and qualitative research methods.

3.1.5 Understanding Challenges in Ethnography

A few concerns in conducting ethnographic research are enlisted and discussed below.

3.1.5.1 Time

In ethnographic research, time is always a concern in conducting fieldwork, analysing data and writing up materials (Murchinson, 2010). Myers indicated that the best time to conduct an ethnographic research is probably during "one's doctoral studies" (Myers, 1999). In relation to this study, the amount of time needed for observation depends on the gaming session and the amount of time the participants' take to finish a stage in the game. It was anticipated that some gamers might take only 20 minutes per game while others may take longer. It has to be noted that the gamers were encouraged to play as long as they want to. My task was only to guide them on what game or console to try first and if they want to continue playing a certain game, change to a new game, or console. Nevertheless, I had to make sure that the participants try both the big screen and small screen consoles for the same type of game. The proposed time for each participant per session is 2 hours (inclusive of game play and interview). Other than the traditional note-taking process, all observations and interviews were video recorded.

3.1.5.2 Availability and Accessibility

Access and availability of the participants can be another concern in ethnographic research (Murchinson, 2010). To accommodate this concern, I created a simulated gaming environment in the AUT HCI lab (making the lab as comfortable and natural as possible in terms of a gaming experience). Participants were gathered by advertising

through email, word of mouth and snowballing technique. Apart from that, issues such as privacy, consent, confidentiality and other ethics consideration were taken into account. Ethics approval from AUTEC was also obtained.

3.1.5.3 Authority of Data

The storytelling nature of ethnographic writing and the fact that the primary instrument in ethnographic research is the researcher may in turn lead to data being influence by the researcher's point of view and beliefs. Hence, it is important for ethnographers to have their "data recognised as having authority" (Brewer, 2000, p. 54).

I decided to chart my data analysis according to Klein and Myers' (1999) Principle's for Interpretive Field Research. This is to mitigate any predicted issues related to authority of data. According to them, it is important for the researcher to be sensitive as a research instrument by:

- Understanding that they could be a "contradiction between research design and actual findings". As regards my PhD research, the inductive nature of the research highlighted the participants' personality type, although the aim and assumptions were originally focussed on the aspects of GameFlow model (Section 5.4).
- Understanding the "possibility of differences in interpretation among participants as are typically expressed in multiple narratives or stories of the same sequenced of events during study" (p.72).
- Understanding the "possibility of biases and systematic distortion in the narratives collected from the participant" (p.72).

3.1.6 Conclusion of methodology chosen

This section discussed the background of the adopted methodology. A qualitative research method with interpretive research approach is chosen for the present study. Interpretive research provides a more flexible opportunity for discovery in studying society and culture. Specifically, the adopted methodology is ethnographically-informed and this section explained the reason for selecting this method is that it is a suitable methodology for this study. The present study has appropriately adapted classic ethnography research. However, this study is ethnographically-informed due to the time frame, scope of research and the use of a simulated gaming environment.

Data for this study is obtained from the intrinsic motivation of gamers when playing games on different screen sizes, on the gamer's behaviour, expressions, reactions and verbal comments to their experiences. The ethnographic method allows me to obtain inductive data that reflects the participants' behaviour, feelings and opinions. Furthermore, I had the opportunity to immerse myself and get a deeper understanding of the study. Moving on, the chapter also discussed the challenges in ethnography (time, availability and accessibility, authority of data). These challenges are considered and managed for this study.

3.2 The Research Design

Once the research question and the research method have been chosen, the researcher has to decide on a research design that is dedicated to answer the research question (Creswell, 2009; Murchison, 2010). In his *Book Research Design in Social Research,* De Vaus (2001) stated that:

> The function of a research design is to ensure that the evidence obtained enables us to answer the initial question as unambiguously as possible. When designing research, we need to ask, given this research question (or theory), what type of evidence is needed to answer the question (or test the theory) in a convincing way (p. 9).

Murchison (2010) and Creswell (2009) are the two general guidelines for my research design. Murchison (2010) discussed in his book 'Ethnography Essential' that the guidelines for designing an ethnography study would be to: 1) link your research question to the data collection method, 2) consider the appropriate key methods to use for the ethnographic research, which include participant observation, interview, map and charts and 3) consider what is practical or feasible by considering the time, availability and ethics. The other research approach that was referred to was Creswell (2009). Figure 3-2 (p. 63) depicts Creswell's qualitative study research design on how a theory would emerge inductively from the data.

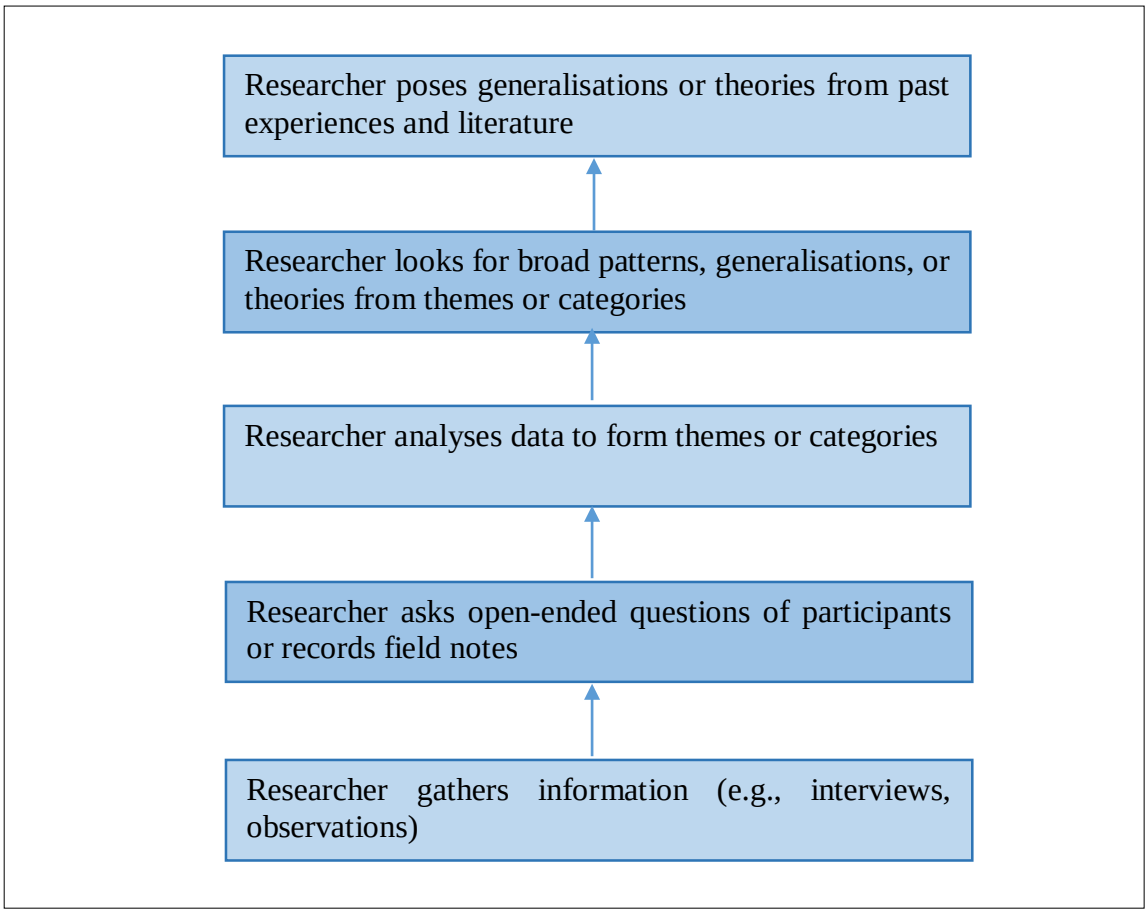


Figure 3-2 The inductive logic of research in qualitative study (Adapted from (Creswell, 2009, p. 63).

To reiterate, I chose to conduct an ethnographically-informed research study to answer my main research question, i.e. “Does screen size affect gamers’ intrinsic motivation when playing video games?” If so, “how does screen size effect gamers intrinsic motivation?”

Informed by the literature on research designed and ethnography (Creswell, 2009; De Vaus, 2001; Murchison, 2010), I designed a research plan (refer to Figure 3-3) that best suited my study.

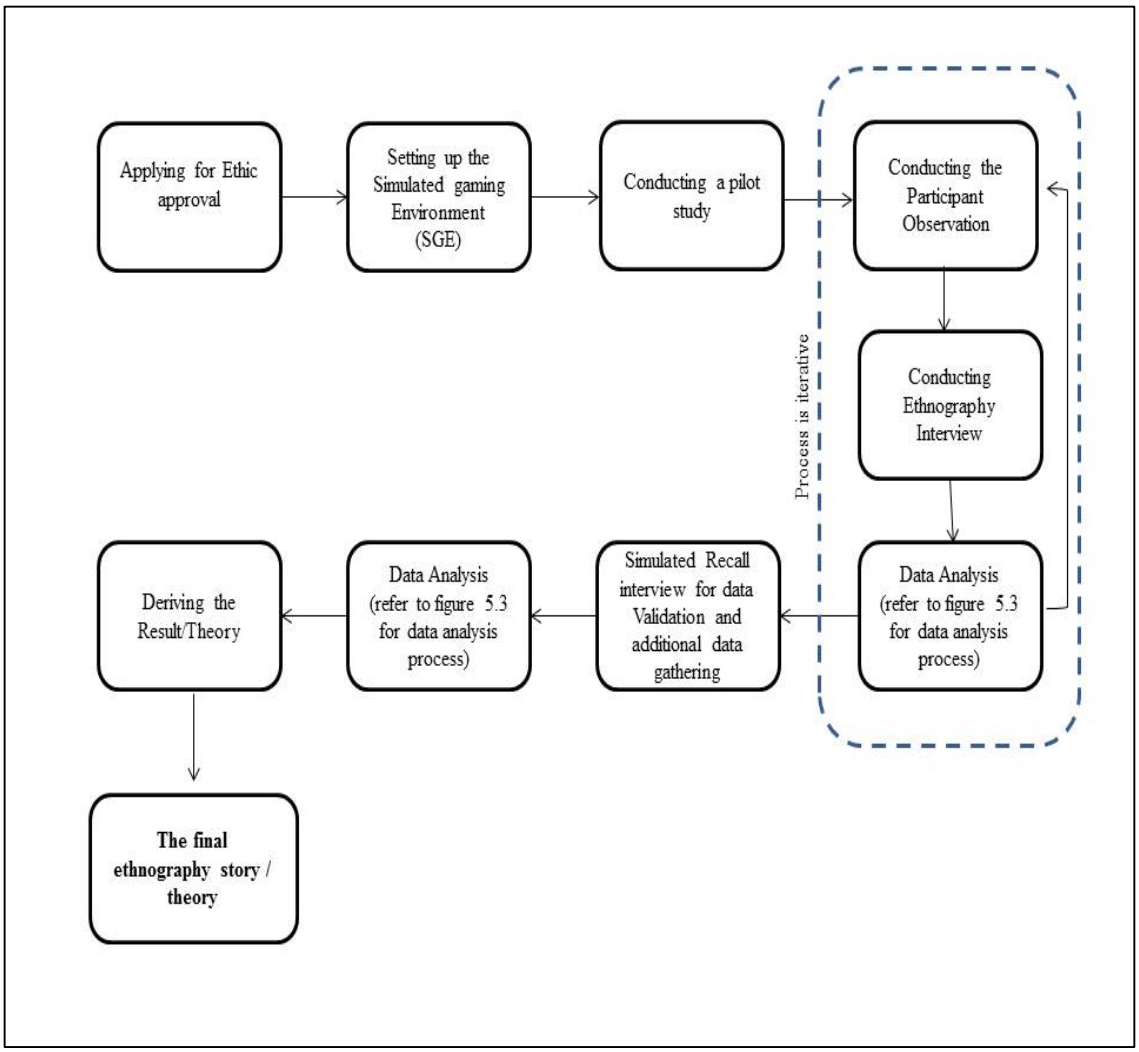


Figure 3-3 Research design

A more detailed discussion on the research design (based on Figure 3-3) will be discussed in the following sections. It will start with the process of the ethical consideration process. This is followed by discussing the process of creating the SGE, and continues with the background of game genres and also the games chosen for this study. Next, the data collection method used for this study, which includes details on the participant observation, the ethnographic interview and the stimulated recall interview is described. Lastly, the discussion on the pilot study is presented. The continuation of the research design process such as data analysis is explained in chapter 5.

3.3 Ethics Consideration

Ethics and privacy are important in ethnographic research. Therefore, the research design of the present study begins with the explanation of the ethical considerations. At the outset of the research, an ethnographer's main priority is on their potential and actual participants (Murchison, 2010). When dealing with human beings directly through participant observation and interviews, ethnographers should protect the subjects not just from physical or psychological injury, but also "safeguarding their privacy and maintaining the confidentiality of all research records that might identify them" (Angrosino, 2007, p. 85). Furthermore, it is essential to cover "all the ethical issues from all aspects of the study including the research problem, research question, data collection, data analysis and interpretation" (Creswell, 2009, pp. 87-92). Research that deals with human subjects (participants) has to go through a rigorous ethics approval process. At Auckland University of Technology, the ethical approval is examined by experts from the Auckland University of Technology Ethics Committee (AUTEC).

The ethical approval for qualitative data collection of the present study was approved by AUTEC on 6th July 2011 (Ethics application number 11/6: refer to Appendix A for a copy of the ethical approval). The form included in this ethical approval are the general ethics form EA 1, which includes issues of participants' privacy, anonymity, confidentiality and the management of data. Supporting documents are also included in the form. The first document is the advertisement that was given out to potential participants in AUT (refer to Appendix B). The second document is the Participant Information Sheet, which includes an invitation to join the research and the background of the research that the participants will participate. Also, it includes the title and the purpose of the research, how the participant observation is conducted, the risk, privacy and confidentiality issues, and how these are addressed. This is to ensure that the participants are well-informed about their involvement and will feel comfortable to participate in this study. A copy of the participant information sheet is attached in Appendix C.

The third and fourth document is the consent form (refer to Appendices D and E) and is divided into two. The first is for individual gamers and the second is for multiplayer games. The consent form is used to ensure that the participants are informed of the overall process of the research and that they agree to take part in the research. Its purpose is also to inform the participants on their right to withdraw from the research and all data involving the participant will be destroyed. Apart from that, the consent form is used to reaffirm their privacy, atomicity and confidentiality rights whenever I use the observation, interview and video data in this study or any other publications or journals.

The participants' names were not be used in this study or any publications to ensure the privacy of the participants involved in the data collection process. Pseudonyms were used and all identifiable personal information was removed. Written and informed consent

from the participants was collected in order to ensure that any concern that the participant might have on deceit, harm or coercion are covered. It is worth noting that the observation protocol and interview sheet help in explaining the step-by-step protocol for the participant observation. This made the data collection process organised and clear from the early stage.

3.4 The Simulated Gaming Environment (SGE)[8]

Murchison (2010) stated in his book *Ethnography Essentials* that:

> Talking about *'the field'* in ethnography is no longer easy to do as it once was. In a way, the field is everywhere and nowhere at the same time. A field site can be referred to as a location of doing research but avoids referring it as a monolithic place of research (p. 14).

Hammersley & Atkinson (2002) also stated that:

> Settings are not naturally occurring phenomena, there are constituted and maintained through cultural definition and social strategies. Their boundaries are not fixed but shift across occasion, to one degree or another, through processes of repetition and negotiation. A setting is a named context in which phenomena occur that might be studied from any number of angles (p. 41).

As stated in the quotes above the "field" in ethnography research can be flexible. As regards to research in gaming, the natural environment is flexible depending on the type of game, the type of console, and type of game modes the gamer chooses to play with. A gamer might play in his or her room, at a friend's house, at the cybercafé, or if they are using a portable device, they can play games anywhere that is comfortable for them.

[8] This area of the thesis also been discussed in Zainal Abidin, N. F., & Wellington, R. J. (2011). *Simulated Gaming Environment for Ethnography Research.* Paper presented at the Proceedings of the 4th Annual International Conference on Computer Games, Multimedia and Allied Technology, Penang, Malaysia. As well as in Zainal Abidin, N. F., & Wellington, R. J. (2014). The Usefulness of a Simulated Environment in Ethnographic Research for Gaming and HCI. *GSTF Journal on Computing, 1*(4).

Reviews were undertaken on previous studies to gain information on suggestions and challenges for the environment suitable for this kind of research. Several studies employed ethnographic research and observation by creating “livings labs” (natural user environment) to test the environment and products (Bolt & Tulathimutte, 2009; Intille et al., 2005; Pierson & Lievens, 2005). Takatalo, Hakkinen, Kaistinen, and Nyman (2011) carried out a study on the differences in user experience when playing digital games at home and the laboratory. They found that there was no strong emotional difference when the gamers were playing either in the laboratory or at home. In another study carried out in Singapore, the researchers found that it was hard to get into the house of gamers because of privacy issue. Hence, a “Simulated Native Environment” was created by Bolt Peters to study gamers and video games. Each gamer was provided with a desk, a laptop, a microphone headset and a webcam. The environment was created in a loft office and was quite homely. Furthermore, the gamers were required to play the game as if they were at home and they were encouraged to say aloud whatever they thought or felt. The gamers were observed from a different room through the webcam located on their laptop and all comments were recorded (Bolt & Tulathimutte, 2009).

Upon reviewing the literature, a few concerns arose when deciding on the suitable environment to conduct this study. The main concern was privacy and safety issues (Creswell, 2009; De Vaus, 2001; Murchison, 2010) as it could be difficult for me to gain access to the participants’ house or room. Most participants might be reluctant to have their personal space recorded or having a stranger in their house. Even though it might be possible for me to observe single player gameplay, it has to be noted that multiplayer games might be more challenging due to the fact that permission must be gained for other players to access another player’s house. The second issue was on the availability of the

equipment that is in the scope of this study. It would have been a challenge to find gamers that have the same equipment available in their house.

Based on the literature mentioned above and the concerns discussed, and the fact that this being an ethnographically-informed study, a comfortable simulated gaming environment was created for the gamers to come and play games as a proxy for the natural environment of ethnographic research. A pilot test and interview were conducted prior to the real research to ensure that the SGE created was suitable for the gamers. All the gamers that participated in the pilot test agreed that the SGE was comfortable and they felt that they were playing in their room or at a friend's house. Notably, they stated that once they started to play the game, they were so immersed that they did not realize that they were in an SGE or were being videotaped.

Based on the literature, the pilot test and the privacy concerns, I concluded that using a SGE that is homely, natural, comfortable and the convenience of having all the games media and the observation equipment accessible, may be another helpful technique in conducting ethnographically-informed research to study gaming.

3.4.1 Setting up the Simulated Gaming Environment

3.4.1.1 The Environment

Upon considering creating a gaming environment, the first thing that I envisioned was a teenage boy gamer's room. However, gamers are now of various ages and gender. Hence, I decided that the main factor to be considered is comfort. Having that in mind, I included a two-seater and one-seater sofa for the gamers to comfortably sit or watch the game being played, a bookshelf where the DVD games, comics, and miniature characters were

displayed, coffee tables, and a television stand that would fit a 40-inch television, as well as the video consoles. A few black and red cushions, and some gaming and comic posters on the wall for aesthetic purposes were also included. The room was fully carpeted and the gamers had the option to play in a dimmed or bright room. Figure 3-4 is a 3D model of the simulated environment. At the back section of the room was a racing car simulator that was part of another gaming project. A standing lamp with a backlight was also available. Figure 3-5 is a snapshot of one of the sessions that shows part of the simulated environment with the sofa, cushions, posters on the wall and the racing car. Also visible to the left of the participant is a mirror used to capture the game play on the television. All of the video recordings for data were taken facing the gamers to capture their behaviour and facial expression. Unfortunately, a picture of the whole environment was overlooked and the moment I realised, the environment was no longer available.

Figure 3-4 The simulated gaming environment

Figure 3-5 Snapshot of part of the SGE

3.4.1.2 The Equipment

The equipment used for the gaming participant observation sessions are tabulated in Table 3.3, which also includes the specifications.

Table 3.3 Equipment used in the participant observation sessions

Equipment	Specification	Function in Research
Television	**Model** Sony Bravia KLV-40S-550A **Display Specification** LCD screen Size 40” (102cm), 16:9	As a monitor to play Nintendo Wii games
Video Camera	**Model** Sony Digital HD Video Camera Recorder. (HVR-V1J), HDV 1080i	To Video and Audio record participant Observation and Interviews
Audio Recorder	**Model** Sony IC Recorder ICD-UX512F/UX513F	To Audio record stimulated Recall Interviews
Game Console	**Type** Nintendo Wii (512 MB built-in and flash memory) **Controllers Used** Wiimote	To play games on a big screen monitor

Equipment	Specification	Function in Research
Handheld Console	**Type** Nintendo DS (256 KB Serial Flash Memory) **Display** (2.4 in × 1.8 in) dual screen, 21 mm gap between screens (~92 lines) **Input** Power button, 8 digital buttons, D-pad, Resistive touchscreen (lower screen only), Microphone	To play game on a small screen monitor

3.5 The Game, Genre and the Console

There are a number of game consoles and massive amount of game genres emerging in the market. It was an overwhelming task to choose an appropriate game for this study. This section explicates the background of the game genre and game type that I chose for this study and the justifications for their selection.

3.5.1 A Background on Game Genre

The computer games industry boomed in 1971 when Nolan Bushnell and Ted Dabney set up a company named ATARI and built the first video game of all time, PONG (Iverson, 2011). Pong was just a simple “bat and ball” video game based on the table tennis sport (Iverson, 2011). In 1980s, video games became the entertainment medium for all generations through the involvement of Japanese Companies named Nintendo and SEGA. New game genres such as platform games like Super Mario Bros and adventure games like The Legend of Zelda were introduced by these companies (Iverson, 2011). To date, the increase in the variety of video game genres is overwhelming; supported by high-end graphics and mind challenging gameplay. Table 3.4 describes most video game genres, each containing a number of styles (Game Genres, 2010).

Table 3.4 Games genre and styles

Genres (15 Total)	Styles
Action	2D Action, 3D Action, 2D Platform, 3D Platform, Action Adventure, First-Person Action, Party, etc.
Adventure	Action/RPG Adventure, First-Person Adventure, First-Person Graphic Adventure, Interactive Movie,
Compilation	Action, Adventure, Educational, Fighting, Home, Puzzle, Racing, Role-Playing, Shooter, Simulation, Sports, Strategy, Traditional. Etc.
Fighting	2D Fighting, 3D Fighting
Home	Art/Paint, Computer Maintenance, Crafts/Design, Desktop Customisat Development Tools, etc.
Racing	Aircraft Racing, Bicycling, Boat/Watercraft racing, Go-Kart Racing, Action Kart Racing, etc.
Shooter	First-Person Shooter, Fixed Screen Shooter, Overhead Free-Roaming Shooter, Platform Shooter, Side- Third-Person 3d Shooter.
Educational	Educational (General), Language, Quiz Game, Test Preparation, General College Math, Reading, Interactive Book, Music, etc.
Puzzle	Action Puzzle, Adventure Puzzle, Maze Puzzle.
Role-Playing Game	First-Person Action RPG, Isometric RPG, Strategy RPG, etc.
Simulations	Business Sim, Construction/Building Sim, Dancing Sim, Dating Sim, Flight Combat Sim, Flight Sim, etc.
Sports	Baseball, Basketball, Billiards, BMX, Bowling, Boxing, Cricket, Darts, Dodge Ball, Extreme Sports, Foolball, Rugby etc.
Strategy	2D Real Time Strategy, 2D Turn-Based Strategy, 3D Real Time Strategy, etc.
Traditional	2D Pinball, 3D Pinball, Board Game, Card Game, Gambling, Game Show, Hidden Object, Jigsaw Puzzle, Logic Game, Miscellaneous Game, Tile Game, Trivia Game, Word Game.

Sources: Game Genres. All Games Guide, http://www.allgame.com/genres.php

For the purpose of this study, I first decided to use three game genres that are considered popular in the game industry. I chose positive games, which are games in the E category. The E rating games are games that can be played by everyone as classified by the entertainment software rating board (ESRB) (ESRB Ratings Guide, 2017). These games have no elements of violence, sexual content or any negative elements. The E category

games that I chose, are educational game, action platform game and action kart racing game.

However, after observing the action platform game (Super Mario Bros.) which was played by two participants who seemed to find the game difficult and confusing, and the fact that most other gamers who I offered were not interested in playing the game, I decided to eliminate the action platform game. Notably, all the gamers participating in this study tried the action kart racing game and the educational game.

3.5.2 Choosing the Genre, the Console and the Game

One of the contributions of this study is to examine if there is any difference in playing games on different screen sizes. The findings of this study may be able to prove that certain game genre would be more intrinsically motivating to gamers if played on a particular screen size. As mentioned in section 3.5.1, this study does not cover games that have negative influence such as violent games or criminal behaviour games. This study focuses on games that create positive impact to the gaming experience and they are in the E category such as educational games, puzzle games and action kart racing games.

The objective of the present study is to investigate the effect of screen size on gamers' intrinsic motivation when playing games. A few considerations are looked into when choosing the game and game console for this study. At the beginning of this study, two distinctive handheld consoles were chosen namely Nintendo DS and the PlayStation Portable (PSP). Both of the consoles have a bigger console that can be connected to a bigger screen. In order to carry out a fair study that would differentiate the two sizes, the console and the game should be similar when played by the gamers. The PSP and PlayStation 3 offer limited choices in offering similar games on both consoles, especially

when it comes to the E rated games or educational games. Therefore, the Nintendo DS (3-inch small dual-screen display) and a Nintendo Wii that was played on a big screen display (40-inch) were chosen. There are also a limited number of games created by Nintendo to be played on both devices. However, I managed to find an educational puzzle game named Big Brain Academy and an action kart racing game entitled Mario Kart, as well as the New Mario Bros., an action platform game that is quite popular among gamers and the gaming style of these games are similar.

The next consideration is that the games have to use the same input method and have similar gameplay on both screen sizes. This, however seems to be difficult because different technologies are embedded in different devices, and different controls. Moreover, the game stages in the game itself are created to suit the game consoles. My initial reason of being concerned with the input method was to try to get the participants focusing on the screen and not having too much data about the input method (e.g. playing using a stylus might be more motivating than using mouse). However, as the study progressed, I decided to review this as another factor that may also influence gamers' gameplay behaviour and motivation. Originally, there are several E-rated Nintendo games that are provided in the simulated gaming environment. However, I decided to study the ones that the participants decided to play. Refer to section 3.7.1.2 for more details on the participant observations process.

Section 3.5.2.1 to section 3.5.2.3 explains the rationale of choosing the game genre and games, as well as a brief background of the games chosen.

3.5.2.1 Educational Puzzle Game Genre: The Big Brain Academy

The increased research on video games and education (DeVary, 2008; Randel, Morris, Wetzel, & Whitehill, 1992; Rankin & Vargas, 2008; Young, Slota, Cutter, Jalette, Mullin, Lai, Yukhymenko, 2012) led to my decision to choose this game genre as part of this study. The results from studying this game genre may be a useful contribution of this study. Choosing the right game for this genre is challenging, as I was not aware of any educational game genre that could be played on the Nintendo DS and on a bigger screen. Therefore, I decided to use mixed genre of puzzle and educational game called the Big Brain Academy, which has good reviews and is available on both the small screen and the big screen.

The Big Brain Academy was first released by Nintendo for the Nintendo DS on July 6, 2006. A Nintendo Wii version was released on July 20, 2007 (Casamassina, 2007; Harris, 2006a). It is worth highlighting that it has received good reviews and millions of copies have been sold throughout the world. The game has the same idea as the Brain Age Game was all about. The Brain Age Game was based on the work of Professor Ryuta Kawashima, a Japanese neuroscientist. He has done research and wrote a book, which discusses that performing certain writing, reading and mathematics exercises everyday may help stimulate the brain. The Brain Age Game calculates the age of the brain, but the Big Brain Academy weighs the size of the brain, implying that the bigger the brain, the smarter a person is. This educational game is equipped with five categories to test the brain. The categories include, think (logic-themed questions), analyse (reason-based questions), compute (math-themed questions), identify (visual-themed questions) and memorise (memory-based questions) (Gertsmann, 2006).

3.5.2.2 The Action Kart Racing Game

An action kart racing game is also used in this study. In the year of 1992, this genre first started when Nintendo used all their characters from the Mario franchise and put them in an action kart racing game. Shiguru Miyamoto wanted to design a racing game where it is easy to be picked up by casual players, and at the same time, offers a challenge to the hard-core players of that generation. As a result, Mario Kart for the Super Nintendo Entertainment System (SNES) was created. The game combines go-kart racing with offensive and defensive weapons thrown into the gameplay. Players get to choose one character in the game and race in a third-person view while using turtle shells and banana peels to win the race. There are three difficulty levels depending on the type of engine the player chooses. Super Mario Kart has become one of the most popular titles of all time (IGN's Top 100 Games of All Time, 2007).

In every new system that Nintendo launched, there will be one new Mario Kart game. The first version featured 3D graphics, more 'power-ups', a power slide and four player split screen that was the Mario Kart 64 for the Nintendo 64. In this game, each player has their own dedicated screen while racing with each other (Jones, 2005).

The games used in this study are Mario Kart DS and Mario Kart Wii. Both games have similar styles of gameplay and graphics. The most notable difference is that one game is for the Nintendo DS, which uses two 2.4 and 3.0 inch screens while the other uses the television as the output. Mario Kart DS is the third bestselling game for the DS as 22.57 million units were sold (Financial Results Briefing for Fiscal Year Ended March 2012, 2012). Mario Kart Wii is the second bestselling game for the Nintendo Wii and the sale was around 32.44 million units (Top Selling Software Sales Unit, 2012). Both games use input buttons to control the kart but Mario Kart Wii uses a gyroscope to steer the kart.

This game was not initially suggested in the proposal of this research but it was made available in the simulated gaming environment, as it is also an E rated game that can be played on both consoles. At the beginning of this study, I noticed that the gamers played this game rather than New Super Mario Bros. The initial gamers and the gamers that attended the pilot study revealed that the New Super Mario Bros. is hard to play and they preferred the Mario Kart game.

3.5.2.3 Action Platform Game

Another game chosen for this study was the action platform game. One of the most familiar and popular games in this genre is the New Super Mario Bros, a side-scrolling platform video game. The gameplay is to control Mario as the character, to race from one point of the map to the other. Most of the gameplay is in 2D, but certain objects are in 3D and thus, resulted in a 2.5D perspective. In the year of 1991, Nintendo launched the Super Nintendo Entertainment System (SNES), which came with powerful graphics and a new Mario game. Super Mario World arrived with the SNES and became one of the bestselling games during the console launch. The character, Mario, is so popular that he appeared in other type of game genres such as sports (Mario Golf), racing (Mario Kart), and puzzle (Dr. Mario). In 1996, Nintendo released the Super Nintendo 64 and Mario was the first three dimensional platform game to feature free-roaming, large open-ended areas and true 3D polygons. Super Mario 64 set a standard on how 3D platforming game should work. Moreover, it was also the last Mario game for that particular console. Later, in 2006, New Super Mario Bros for the Nintendo DS was released featuring 2D platforming with 3D graphics. As regards the Nintendo Wii, Mario went on and starred in a couple of new games such as New Super Mario Bros Wii and Super Mario Galaxy (McLaughlin, 2007).

Interestingly, the new Super Mario Bros for the Nintendo DS was given favourable reviews. IGN (Harris, 2006b) and Gamespot (Gertsmann, 2006) gave this game a stellar review. Its gameplay ranges from fairly easy to moderately difficult. The player takes control of Mario and guides him from one end of stage to the other. Players need to avoid obstacles and jump on platforms. The objective of this game is to rescue Princess Peach from the evil dinosaur called Bowser. This is a game of skill and timing that challenges the players' hand and eye coordination. Both New Super Mario Bros and New Super Mario Bros Wii have the same game structure except for the stages. Both games have the same input method and have multiplayer option.

The New Super Mario Bros and New Super Mario Bros Wii were played by two of the participants of the present study (see section 3.7.1.2) and were offered to other gamers who came to the gaming sessions. However, most of the gamers seemed uninterested and declined to play the games. Those who played the games found them very confusing and difficult to play. The reason for this was that playing this game was difficult using the Wiimote (see section 6.4.3) and it is a longitudinal type of game. Most gamers who came to these study gaming sessions wanted to play a game that is short, fun and can be played repeatedly.

3.6 Participant Recruitment (Judgemental /Judgement Sampling or Purposive Sampling)

Once AUTEC approved the ethical application, the participant recruitment process began. Purposive sampling or judgemental/judgement sampling was employed since the participants were selected based on the researcher's judgement that the participants would be the most suitable candidates to provide the information required for the study (Fetterman, 2010). Creswell (2009) indicated that, "purposefully select participants or

sites (or documents or visual material) that will best help the researcher understand the problem and the research question" (p.178). Moreover, the use of purposive sampling is to make sure that the researcher will learn, discover and gain insight from the most suitable sample that will provide the most information on the research topic (Merriam, 2009).

Prior to starting the present study, I clearly set the criteria for gamers' selection. Firstly, all the participants must have sufficient knowledge and skill on how to play video games (i.e. ample knowledge about gameplay or using certain controllers). Secondly, the gamers are aged between 18 and 40, considering that 78% of gamers in New Zealand are 18 years or older, and the average age of gamers is 33 years old (Brand, 2010). Lastly, the participants are gamers, where their daily activities usually include gaming, whether it is computer game, playing games on their mobile, or consoles games.

I started the participant recruitment with direct conversation with friends that I know that are enthusiastic gamers. Also, I contacted potential participants through Facebook. When the data collection began, more participants were recruited through the snowballing approach (Denscombe, 2003). Snowballing is a form of purposeful sampling that usually begins after the data collection commences, and when the researcher asked the participants to recommend, nominate or refer to any other suitable individuals that might be interested to participate in the study (Huberman & Miles, 2002). I also emailed my advertisement (Appendix A) to the participants who had already joined the gaming session. Subsequently, they displayed the advertisement at their department or emailed it to their friends. Interested participants then made an appointment with me to join the gaming sessions.

I started the gaming sessions on May 2011 till May 2012 with 18 participants (see Table 3.5). The gamers ranged from 18 to 36 years old. Seventeen (17) were male and one (1) was female. I believed that the sample size was adequate to provide me with in-depth and saturated data for this study. Angrosino (2007) stated in his book, *Doing Ethnography Observational Research* that "the size of a sample depends on the characteristics of the group you are studying on your own resources, (i.e. legitimate limitations on your time, mobility, access to equipment, and so forth), and on the objectives of your study" (p. 48). Tengku Kasim (2012) also argued that there have been mixed guidelines from researchers when it comes to data sampling and how many would be enough for data saturation. In her qualitative study, 19 participants were enough for her to gain a saturated, rich and in-depth data. Guest, Bunce, & Johnson (2006) suggested that 6 to 12 interviews from a relatively homogeneous population were enough to reach data saturation.

Table 3.5 The participants' demographics

No	Participant	Age Group	Gender	Gaming Experience (Yr)
1	Alan	29	M	15
2	Brian	32	M	24
3	Carl	31	M	20
4	Dean	27	M	10
5	Elle	29	F	2
6	Fred	30	M	23
7	George	23	M	15
8	Harold	21	M	16
9	Isaac	36	M	5
10	John	28	M	18
11	Ken	20	M	3
12	Luke	21	M	5
13	Mike	22	M	5
14	Nelson	22	M	8

No	Participant	Age Group	Gender	Gaming Experience (Yr)
15	Owen	29	M	15
16	Peter	21	M	8
17	Rick	22	M	12
18	Steve	22	M	5

Note: For confidentiality purposes different names are given to represent each of the participants.

3.7 Data Collection Process

In ethnographic research, "the researcher (ethnographer) has the unique position of being the primary research instrument (human instrument) in collecting and analysing the data. Relying on all his or her senses, thoughts, and feelings, the human instrument is the most sensitive and perceptive data-gathering tool" (Murchison, 2010, pp. 12-15). However, this also carries disadvantages since the instrument can be subjective and misleading. The study can be conducted objectively if the ethnographer refers to ethnographic methods and techniques as a guide (Fetterman, 1998). The data gathered for this study was collected using two ethnographic data gathering methods, namely participant observation and ethnographic interviews. Upon reviewing the literature, it was found that these data collection methods are widely used in ethnographic research (Angrosino, 2007; Creswell, 2009; Murchison, 2010) and it relates to the, "principle of interaction between researchers and the subject for interpretive field research where data is constructed through the interaction between the researchers and participants" (Klein & Myers, 1999, p. 72) for interpretive research.

3.7.1.1 Participation Observation: Literature Overview

Over the years, observation has been a reliable instrument for data collection in qualitative research due to its ability to uncover human behaviour and emotion, and also a good

support for data collected from interviews and document analysis. It has been described as a method that provides "a systematic noting or recording of events, behaviours and artefacts (objects) in a social setting" of a chosen study (Marshall & Rossman, 2011, p. 139). As participant observation is the main data collection method for this study (and was rather new to me), I deemed that an understanding of the method is important to determine my role as an observer.

Baker (2006) specified that observation is considered a "complex research method because it often requires the researcher to play a number of roles and to use a number of techniques including her/his five senses, to collect data" (p. 172). She continues to describe the variety of researchers' roles from the literature that can be adopted when conducting an ethnography research. The roles are summarised in Table 3.6

Table 3.6 Role of researchers

Role of Researcher	**Description**	**Advantages**	**Disadvantage**
Nonparticipant	The role of the researcher is to not be present on the scene but observe from another environment or place	Easy access to multiple participant and non-intrusive	Does not allow in-depth understanding of people behaviour in their own world
Complete Observer	The researcher in at the scene but do not interact or participate with the participant. The role is to listen and observe.	Unobtrusive and completely detached from the group allows. Unbiased. Suitable for starting a research.	Could not ask question or verify his/her observation queries.
Observer as Participant	The researcher focuses more on observation than participation but has a slight involvement with the participant. Observe and conduct small interviews.	Participant may be more comfortable to talk to strangers then to somebody they are familiar with, and less temptation for the observer to go native.	Brief encounters might limit gaining more knowledge. May lead to misconception or misunderstandings.

Role of Researcher	Description	Advantages	Disadvantage
Moderate and Peripheral Membership	Maintaining a balance between being participation and observation. The researcher interacts with the insiders and engages in similar activities but do not participate in the activity.	Able to interpret data from a detached perspective, Can intentionally restrict the level of involvement to avoid participation in certain activities in the study.	
Participant –as-observer, Active Participant, Active Membership	Researcher become more involves with the participant central activities but still does not fully commit to members' values and goals.	May gain more personal information, Observer as a group member.	Insider may identify too much with the researcher. Researcher tends to over identify with the insider, loose objectivity and go native.
Complete Participation	Ultimate level of involvement as the researcher goes native. Researcher act as a member not as a researcher. Identity of researcher is unknown.	Gain ultimate understanding of the participant/culture Unobtrusive	Need to have an undercover character that may disrupt the researcher's performance. Might have problem in reporting his findings because of his observer role.
Complete Membership	Instead of acting as a member, the researcher become totally involved in the character. The membership role exceeds the researcher role. Or The researcher starts the research as purely data-oriented but converted into the phenomenon to be studied.	The depth of the data is of high value. Gain great insight on the culture being studied.	The researcher role can be contaminated by the insider's status and the difficulty to remain objective.

Adapted from Baker (2006, pp. 173 -179)

Based on literature, participant observation or active participant is favourable among ethnographers and it is deemed that this is the most suitable observation technique for this

study. It will allow me to be involved as a novice gamer and still maintain the role of the researcher (Angrosino, 2007; Fetterman, 2010; Marshall & Rossman, 2011; Murchison, 2010). During the sessions, I plan to observe the gamers play the game but at certain time such as when there are not enough gamers to join in the multiplayer sessions, I will participate in the gaming sessions.

In detail, participant observation is a method whereby the researcher collects data by means of observing and participating in the daily activity of the participants. The goal is to yield a deep understanding of social interaction and encourage the participants to converse in a more natural environment (Fetterman, 1998; Murchison, 2010). It involves data gathering by "watching, observing and talking to participant to discover their interpretations, social meanings and activities" (Brewer, 2000, p. 59).

DeWalt and DeWalt (2011) stated in their book *Participant Observation: A Guide for Fieldwork*, participant observation is:

> A way to collect data in naturalistic settings by ethnographers who observe and/or take part in the common and uncommon activities of the people being studied. It also includes the use of information from participating and observing through explicit recording and analysis (p 2).

Delamont (2004) concurred that for participant observation, it is not a requirement for the researcher to be 100% involved in all the activities. However, it is sufficient for the researcher to watch, help, or try out occasionally as to be able to capture and discuss the environment or activity being studied. Moreover, the researcher is encouraged to interact with the participants while they are doing certain activity and "the researcher may do the same thing but it is not a requirement" (p. 218).

In addition, participant observation was chosen as the main data collection method because of its recognition and involvement in ethnographic research (Murchison, 2010), and how it is now used in the studies on gaming. Observation and participant observation provide insights on various aspects of gaming culture ranging from online gaming to human behaviour in playing games (McLaughlin, Gandy, Allaire, & Whitlock, 2012; Williams, 2007). Wood, Griffith, & Eatough (2004) further explained that participant observation provides the advantage of being able to understand what gamers feel when they play the game, knowing gaming etiquettes and experiencing the, "actual dynamics of the games", which would "be beneficial in terms of designing, implementation and analysis of video game studies" (p. 514). Boellstorff (2008) carried out an ethnographic study in the virtual world. He employed participant observation in order to understand the cultural logic of the virtual environment such as making money, cross-gendering, sexual debauchery, sexual encounters, which collectively is called the second life.

Another ethnographic study that was carried out to understand "how food is used to create identity and community for games during core rituals" employed participant observation as one of the stages in the research method by going to a variety of, "gaming venues where six of it being home based LAN events" (Szentgyorgyi, Terry, & Lank, 2008, pp. 720-728). Voida and Greenberg's (2012) studied console gaming practices across four generation by means of employing observation in the field as one of their methods to gain insights on the patterns of gameplay between generations. Another ethnographic study was carried out by Aarsand (2007) on the intergenerational divide between children gamers and adult gamers using participant observation and interviews.

It is noteworthy that one of the objectives of this study is to gain insights on gamers' behaviour while playing games. I played the role of the observer and sometimes joined in

the gaming sessions with the gamers. In the next section, I will describe how I conduct my participant observation session.

3.7.1.2 The Data Gathering for Participant Observation

The sessions begin with me setting up all the equipment required for playing and recording the game session. I will refer to my observation protocol (Appendix F) that was set up during my ethical application. The sessions were set by appointment. Some gamers come in groups and some individually. I begin the participant observation session when the gamers arrive. I introduce myself and show them around the simulated gaming environment. Then, they were given the information sheet to get a general picture on what the research is about and what they are required to do. I then ask if they have any questions regarding the information sheet or any questions in general. Subsequently, the participants were given the consent forms to go through. Before they sign the form, I made sure that they understand all matters regarding the gaming sessions and have no more enquiries or concerns. Once all forms are signed, they were ready to begin the session.

The gamers were then being invited to sit comfortably in the room and offered to play either the Nintendo Wii (which is played on the big screen) or Nintendo DS. Once they had chosen which platform they want to try, they are given a few games to choose from that are available in the room. The option was given in the effort to maintain the ethnographic approach of not influencing the gamers. The game options available for the Nintendo Wii were Super Mario Bros. Wii, Mario Kart Wii, Super Smash Bros Brawl, Big Brain Academy for Wii and Links Crossbow Training. The game options for

Nintendo DS were Mario Kart DS, New Super Mario Bros DS, Big Brain Academy for DS, Dr. Kawashima Brain Training, Scribblenauts and Professor Layton Pandora's Box.

Even though the gamers were given the option to choose which game to play, most of them asked me to choose for them. I decided to study the games that most of the gamers chose and as the research went on, I finally offered just two games that were available in both big screen and small-screen devices, which were Mario Kart and Big Brain Academy since these were the favourite games among the participants.

Before they started playing the game, I asked about the lighting, i.e. whether they want it dimmed, bright or turned off. Then, the participants were asked to make themselves at home. The participants were encouraged to express their feelings during the gaming session and employ the "talk aloud or think aloud" technique. Talk aloud session is an effective way to gain information from the participants. However, there might be some occasion when participants do not describe action or facial expression verbally. Consequently, asking appropriate questions to clarify the participants' actions is the best solution to understand these situations (Carter, 2007). Apart from that, this technique was also employed during the stimulated recall interview. The participants come from different countries such as New Zealand, China, United Kingdom and Malaysia. The participants were given the freedom to either speak English, Malay or both; whichever they are comfortable with. I had to limit to only these two languages since I was the transcriber of the data gathered.

As the gaming sessions progressed, the talk aloud method was found to be an ineffective way to obtain information as it interrupted the gaming sessions. Therefore, I decided to observe the gaming session and answer any questions from the participants during the

gaming sessions. Also, I made sure that the participants were aware that they were allowed to act as naturally as they want during the sessions because some of the participants might worry about making too much noise. I was satisfied that all participants acted naturally during their gaming sessions. There was laughter, screams, jeering, stomping of feet and comments throughout the gaming sessions.

I used a video camera to record a large proportion of the gaming sessions. I positioned the camera so that it would record the participants' face and their gaming actions. I put a mirror behind the participants so to reflect the television and can be captured in the camera. Refer to Figure 3-6 and Figure 3-7.

Figure 3-6 Participant observation for individual gaming using the Nintendo Wii (Big Screen)

Figure 3-7 Participant observation for multiplayer gaming using the Nintendo DS (Small Screen)

I would sometimes join the gaming sessions and/or become an active spectator giving support, encouragement, as well as laughing to the gamers' jokes. I will also take note of the details that I feel important during the sessions.

The sessions typically last from 2 to 8 hours a day. However, it has to be noted that there were times when the participants hang out to talk about games, having lunch or getting to know each other. The participants were invited to more than one session. Some participants visited the SGE for more than 10 times but not always to play a game. Sometimes, they were there just to hang out with friends that are joining the gaming sessions. Surprisingly, some participants came two days in a row and stayed for 6 hours each day. Most of the gamers who tried both game genres were eager to return for more gaming sessions. Some gamers who did not manage to play both game genres were invited to return but due to other commitments or lack of interest in trying the other genre, they did not return for another session.

Throughout the year, a total of 120 days were spent collecting data. Not all sessions were videotaped but the observer was there for every gaming session to take note of anything that stands out. To reiterate, I have set certain criteria for the gamers; one of which is that the gamers are required to have some knowledge on gaming and using the controllers. Once the data collection method started, I found that some of the participants were not familiar with the Wiimote. Nevertheless, I decided to continue the study with these participants as this will be regarded as important data for my research and will be discussed as part of the results.

After each gaming cycle is completed, an interview session was conducted. A gaming cycle is usually 4 races (for Mario Kart) or 1 level (for Big Brain Academy). Usually, this interview session takes around 5 minutes. The questions were unstructured and focused on the gamers' behaviour that occurred during the sessions. The participants were free to comment on anything that were in their mind during the interview sessions. After the short interview session is complete, the participants continue with the gaming session. However, it is worth noting that interview sessions were not conducted every time after a gaming cycle ended. This is because some of the participants were so immersed in the gameplay that they did not want to stop for an interview. At the end of the day, a summarised short interview was done after the participant decided that he or she was ready to finish the participant observation session. In this interview, general questions and grand questions were asked. The final interview usually takes around 15 to 30 minutes, depending on the participants' answers, which varies. Some participants have a lot to comment, while some do not. All of the single player interview sessions were usually done in private, while the multiplayer interview sessions were conducted in groups. The interview sessions are explained in detail in section 3.7.2.

In the present study, I collected 881 minutes of video data containing the observation of the gaming sessions and informal interviews. There are also 13 semi-structured interview notes that were jotted down in my field notes. I was with the participants in the SGE during all the gaming sessions. Three participants requested to take the Nintendo DS home. They held the console for a week and played any games available in the DS. The participants were interviewed later on. Apart from that, I also spent some time watching the gamers play at my house and visiting my friends at their house playing the Nintendo DS and the Nintendo Wii. Observation notes were also taken during these events. Figure 3-8 and Figure 3-9 illustrate the general flow of participant observation session for this study.

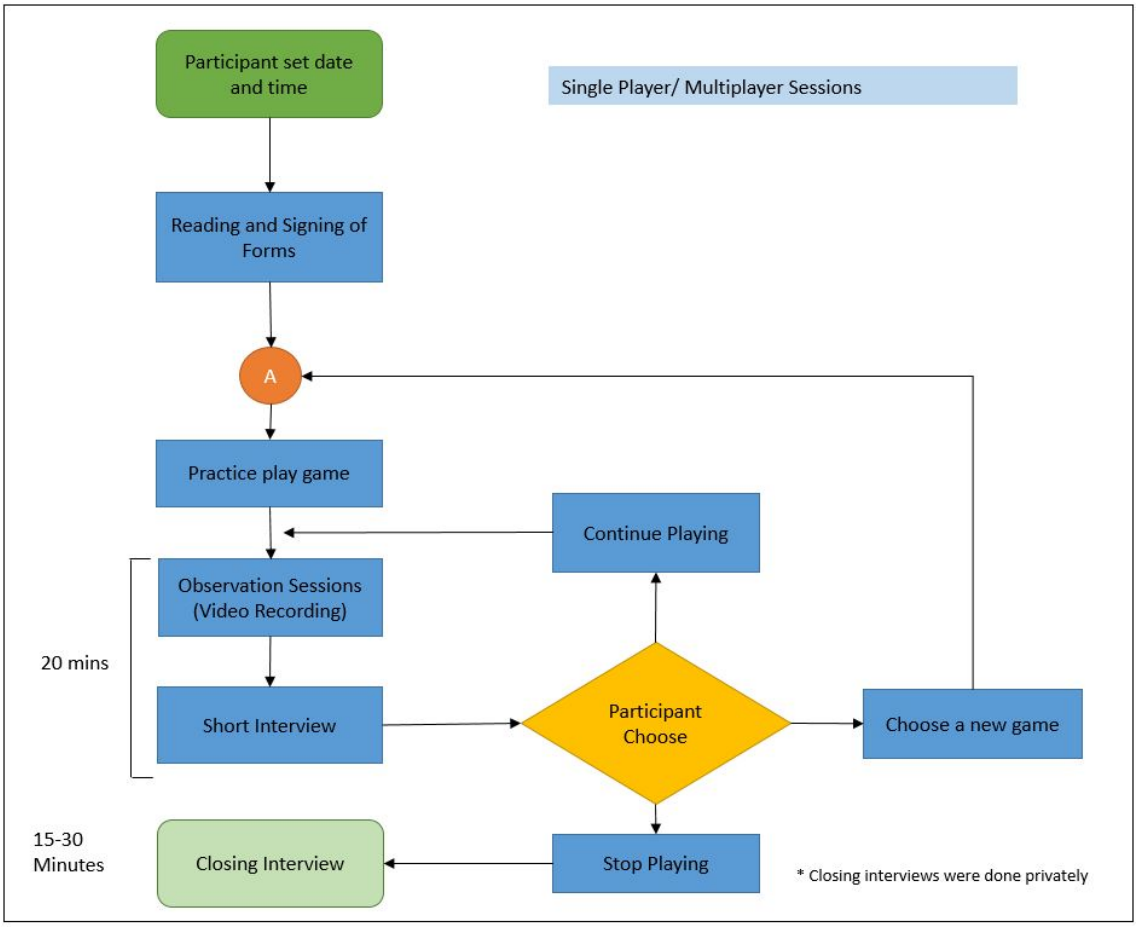


Figure 3-8 Participant Observation Flowchart

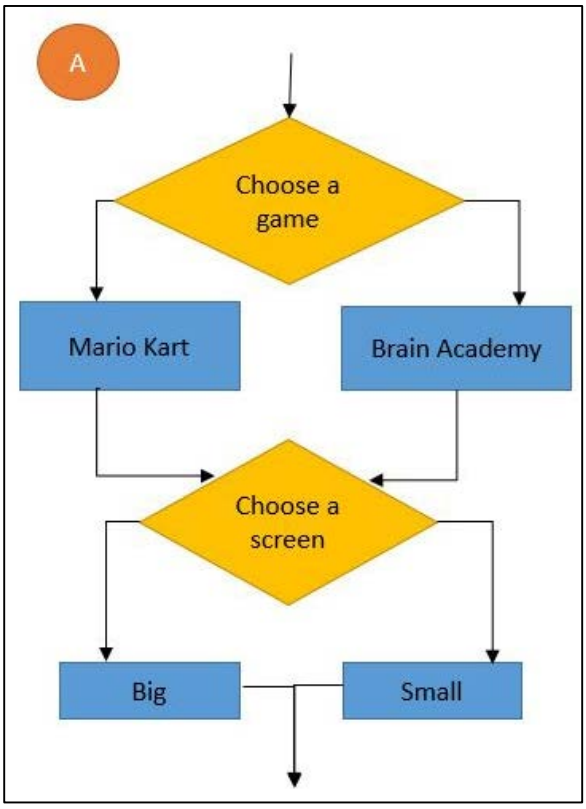


Figure 3-9 Participant Observation Flow Chart (A)

3.7.1.3 Participant Observation Scenarios

Most of the participant observation sessions in this study varied according to the participants and appointments. Here, I would like to provide a few scenarios of a participant gaming session.

I. Scenario 1: Single Player Session.

In single player situation, the participant will usually set a time and date on when he or she wanted to come. The minimum time for a gaming session is around 2 hours. The participant were required to fill in a consent form and read the information sheet. A brief explanation on the research and the details of the participant observation procedures were explained. Before the participants start the gaming session, they were given an option to choose the game they want to try and the consoles (either Nintendo Wii or Nintendo DS).

Some of the participants knew which games they wanted to play. However, they had the tendency to seek for suggestions on which game to play. Following the selection, the participant started playing the game. Usually, the participants will ask for a couple of practice sessions in order to be comfortable with the game. The participants were allowed to ask any questions if they were unclear about any issue pertaining to the gameplay. Once the participants were ready to begin the observation gaming session, a video camera start to record their sessions. After a typical game cycle ends, I asked the participant if they want to try another game or another console. In most cases, the participants wanted to play the same game until they were satisfied or until they win. Sometimes, they wanted to change to something different. After one gaming cycle, I conduct a short interview with the participants. Once their two-hour session was over, I asked them if they wanted to continue, come back again or if this is their last session for the day. If he or she chose to end the session, a closing interview will be conducted. If he or she choose to come again on a later date, I suggested a different game on a different screen in order to get data from both type of consoles and games.

II. Scenario 2: Overlapped single player sessions

This scenario happened when a single player session overlapped with another single player session. This normally occurred when the first participant wished to stay longer to play the games. Therefore, the first participant will be asked if he or she wants to stay and observe, or continue playing. If the current participant wanted to continue playing the game, the second participant will be asked to try out a different console that is not currently being played. Now, the second participant is given time to do a practice run. Sometimes, the video recording sessions can be done simultaneously because the gamers will be using different consoles and the Nintendo DS is portable. If both participants played single player game, the interview will be conducted in private in order to not

influence the other player. In some cases, both participant were asked if they would want to play the multiplayer mode for the games and consoles. When this happen, the gaming session changed from a single player session to a multiplayer session.

III. Scenario III: Multiplayer Sessions

Another scenario is for multiplayer gaming sessions. The participants who attended multiplayer gaming sessions are already friends and they had to decide what they want to play among themselves. The sessions flow is identical to the single player gaming session and the session will stop when they collectively agreed on it. The short interview and the closing interview were done in group and it will take longer time since each participant will be given the opportunity to speak. In some cases, the multiplayer participants broke into a couple of single player session when they feel like playing alone.

3.7.2 Ethnographic Interview

One of the features of ethnographic research is having more than one data collection method. In ethnographic research, participant observation method is usually supported by other data collection methods to gain more insights or information on the research topic such as interviews or document analysis (DeWalt & DeWalt, 2011). Delamont (2004) explained that with regard the participant observation, a mixture of observation and interviews are beneficial for the researcher to better understand the culture that they are studying. Interviews provide opportunities for researchers to ask direct questions and gain access to the participants' personal thoughts and experiences. An ethnographic interview is more "informal in nature and should not feel like an interrogation" (Murchison, 2010, p. 101).

In this study, a short one-to-one closing interview session was conducted at the end of each participant observation session. In an ethnographic interview, the ethnographer can interview and listen while participating and observing the participant. However, it is also necessary to conduct an interview at different time that is open-ended and unstructured (O'Reilly, 2005). During my participant observation sessions, I interviewed the gamers after each session of gaming session on screen size, game genre and console. The gamers started on a different gaming session either with to play a different game or a different console and I will interview them again. Once they have finished all sessions for the day, I asked them to share their experience of the day again. The interview sessions usually last between 10 and 30 minutes. The interview was done to provide the participants an opportunity to share and describe their feelings during the gaming session. It is also important for me to better understand certain behaviour that happened during the gaming session. The interview sessions were open-ended, which are flexible, deep and expansive (Denscombe, 2003; Murchison, 2010).

I conducted an unstructured interview, which was more friendly and conversational (O'Reilly, 2005). This is so as I wanted the gamers to share, in their own words, any additional information, knowledge and opinion they have after completing the gaming sessions. Usually, I started the interview with a conversation by asking them general questions (Gibbs, 2007b, p. 49) such as:

1) How long have you been playing computer or video games?
2) What type of games do you usually play?
3) Talk about the games you play and why you choose that particular game?

When I found answers to be intriguing, I asked “follow-up questions” to get the “depth and detail of the particular topic” (Rubin & Rubin, 2005, p. 136). For example:

1) So, you like first-person shooters game, what screen size do you play it on?
2) Why do you like this genre of games?
3) How many hours do you spend when you start playing this game?
4) What motivates you to play that long?

Next, I continued with the “main question” or “specific grand tour questions”. The main questions are related to the research topic and encourage the participant to talk about their experience and perceptions (Rubin & Rubin, 2005). Specific grand tour questions are for the participants to describe their experience on the most recent event, which in this case, playing the game at that particular time (Gibbs, 2007b; Leong, 2012; Mayan, 2009).

The main question and specific grand tour questions I asked were:

1) Can you describe your experience while playing the game just now?
2) Can you describe the feeling that you have when playing the game?
3) What do you think of the simulated gaming environment?
4) Do you have any other comments or information on the gaming sessions?
5) Can you describe your feeling or experience that you have when playing this game on a big screen?
6) Can you describe your feeling or experience that you have when playing this game on a small screen?
7) How do you feel when playing split screen on the big screen for multiplayer? What about when playing multiplayer on the DS?

Some "follow-up questions that are usually used to explore or work out issues that are confusing or unclear to the researcher" (Rubin & Rubin, 2005, pp. 137-139) were also asked during the interview for clarification of behaviour such as:

1) I noticed that you have been turning the Wiimote all around, how do you feel at that time?
2) Any comments on why you were doing what you did?

The probes or probing questions (Rubin & Rubin, 2005) are also used to facilitate further elaboration from the participants. Examples of question are:

1) Can you elaborate more on what you said?
2) Can you provide an example to your statement?

All interview sessions were included in the field notes audio and video record.

As mentioned earlier, a short interview session is also held between gaming cycles. However, this interview was only conducted if the gamers are willing to stop in between the gaming cycles. I usually observed the gaming cycle and if there was an opening, I asked a few questions to understand the behaviour or comments made during the gaming cycle. Notably, gamers were sometimes so immersed in the game and I can only conduct the interview at the end of the sessions.

3.7.3 Stimulated Recall Interview

The stimulated recall interview is sometimes used in the area of education research. It is described as an, "introspection procedure in which (normally) videotaped passages of behaviour were replayed to individuals to stimulate recall all of their concurrent cognitive ability" (Lyle, 2003, p. 861). In addition, it is a research method that allows the

investigation of cognitive processes by means of inviting the participants to recall concurrent thinking during an event when prompted by any form of visual recall (Fox-Turnbull, 2009). This method is also employed to gather data in other studies such as ethnomusicology and cognitive psychology (Braun & Clark, 2006).

Dempsey (2010) employed stimulated recall interview in his ethnography study and found that it is beneficial in stimulating the participants' memory by letting them view and listen to their actions and more precise answers to questions are gained. In this study, I decided to use stimulated recall interview to gather more insights on the data I gathered as well as to provide "data validation" or "member's checking" to my data transcription (Murchison, 2010). In addition, all the gamers were invited to participate in the stimulated recall interview for data validation, but only five replied. The gamers were required to review the video recordings and verify, comment and correct the transcription during the stimulated recall interviews.

The stimulated recall interview for this study took place after the transcriptions were complete. The gamers were called back for a session, in which they had to watch the video recordings that were taken during their gaming sessions. During the interview, the participants were to be seated comfortably on the sofa. The video and transcription are displayed on a 40-inch television so that the participants can see and hear clearly all the actions and comments made. Then, they were asked to read the transcription of the video and verify the transcription. I stopped in between sections of the video to ask if there are any changes that need to be made or if they are any additional comments to add in those sessions. I also stopped or rewound any session in the tape or transcription that they need to view again or if they want to clarify anything. The gamers were also asked to explain some behaviour that were unclear to me during transcription. They were also encouraged

to provide additional information, opinion, or insights on the gaming session during or after watching the video.

The session for each participant was conducted on separate days. The participants were only asked to view and read the transcription of their sessions. If they were playing with another participant during a multiplayer session, the participant was asked to focus on their video and only read their transcription. They are allowed to comment on a response they made to other participants, i.e. actions or comments during the sessions. At the end of the session, another interview was undertaken. This was to clarify the participants' behaviour as well as to ask them if they have any new comments to add during their observation sessions. The stimulated recall interview sessions accumulate 100 minutes of audio recording.

Additional questions were also asked via Facebook and emails to clarify certain aspects of the data analysis. The most crucial verification that was needed was on the gamers' personality type. The aspect of personality type was not in the initial interview questions as that was not the aim of this study; to compare the gamers' personality types. However, during the inductive analysis of the data, two distinct personality types emerged namely the extroverts and the introverts. To verify the classifications of the gamers into these two personality groups, I contacted the gamers via email and Facebook to confirm which personality group that best represented them.

3.7.4 Saturation of Data

The total length, scope and frequency of time spent in the "field" is of utmost importance in the data collection of participant observation (Murchison, 2010). Mayan (2009) also

adds that there are four factors to be considered when determining the sample size, namely "the scope of the study, the nature of the topic, the quality of data and the use of shadowed data" (pp. 3 - 4). In addition, the sample size of qualitative studies usually follows the concept of saturation. "Data saturation usually means that the collection of new data does not shed any further light on the issue under investigation" (Rubin & Rubin, 2005, p. 1). However, Morse (1995) stated that "the quantity of data in a category is not theoretical important to the process of saturation. Richness of data is derived from detailed description, not the number of times something is stated" (p 148).

In the course of collecting data, it became evident that I was no longer uncovering any new behaviours or opinions. Hence, I began to notice that participant behaviour had started to be repetitive between different participants. This is later supported during the data analysis phase (refer to 4.3.1.1 and 4.3.1.2). During the data analysis phase of the present study, all videos were transcribed including every word uttered and every action observed. Based on the data transcribed and the outcome of the analysis, I felt confident that I had reached saturation of data once there no new themes emerged from the analysis.

3.8 The Pilot Study

In the course of doing this study, I decided to conduct a pilot study, which was a "trial run" of my research (Teijlingen & Hundley, 2002, p. 1). Teijlingen and Hundley (2002) stated that a pilot study is a small-scale version of your research design that is done before conducting the main research. In addition, it can be employed to test the research instruments or the feasibility of the study. One of the advantages of conducting a pilot study is it provides opportunities to make valuable changes to the research design,

research settings and data collection protocols, if needed before the main data collection process begin.

With regard to the present study, I chose to conduct a pilot study to check several sections of my data collection and bearing in mind that this is a preparation for me to conduct my real research sessions. Two gamers were invited to participate in my pilot study and they were chosen to test several elements in my study, which are:

1) The observation protocol and ethnographic interview sessions

I followed the observation protocol (see Appendices F, G, H) that was approved by the ethics committee. No major changes needed to be made in terms of the flow of the protocol or the questions to be asked. Moreover, the sessions were clear and practical. However, a change was made based on the pilot testing. I decided not to interrupt the gaming sessions with questions due to the fact that when gamers were immersed in the game, they would get distracted and annoyed when questions were asked. Hence, questions (Appendix I) were only asked when the gamers stopped playing the game or when they were in a relaxed mode and at the end of each gaming session.

2) The research equipment

Another reason for pilot testing is to become familiar with the selected research tools. As regards this study, I have never used video as an instrument for data collection before. Therefore, it is important for me to become familiar with the recording equipment, as well as the technique of capturing and converting the video. Moreover, I have to make sure that the angle chosen to capture the participants was sufficient for my data analysis. As a result of the pilot study, I deemed that the participants' whole body needed to be captured. Also, I decided that a mirror that reflects the television screen to be located at the side or

behind of the gamers to get a glimpse of what is happening in the game that may instigate certain reactions. Although this is not possible when playing a game on a smaller screen, I decided that writing field notes on their reactions during the game sessions would be sufficient.

In terms of the gaming consoles, it has to be noted that I am familiar with the game console being offered. However, it is also important for me to test the installation and the game procedures to avoid any technical concerns. I also tried to familiarise myself with one of the games as I have never tried the game before. Initially, I wanted to offer any type of console that the gamers wanted to try. After the pilot study, I decided to offer only games that were played either by the Wiimote or the Nintendo DS. This is due to the fact that other gaming consoles such as the Xbox 360 and KINECT were outside the scope of study.

3) The validity of a simulated gaming environment for ethnographically-informed research

As discussed earlier in this chapter, the concept of "field" in ethnographic research has evolved. I concluded that the natural environment for gamers could be at home, at a friend's house or in a gaming café. My argument is that an ethnographically-informed gaming study can be done in a simulated gaming environment, provided that it is as comfortable and as natural to the gamers. The pilot study was undertaken to get the feedback from the gamers on the setting and the results of the pilot study were discussed in the GSTF Journal on Computing 2012 1(4), titled *The Usefulness of Simulated Environment in Ethnography Research for Gaming and HCI* (Zainal Abidin & Wellington, 2011).

It was found that the gamers do not feel that they are in the simulated environment once they are enjoying the game. The gamers were not aware that they were being video recorded. They were happy to shout, curse and laugh out loud. In addition, I found that the gamers are particular about the lighting of the simulated environment. Hence, for the real study, I have to ask the participants on which lighting condition would be suitable for them.

3.9 Chapter Summary

This chapter discussed the research design of the present study including the data collection method, the research environment, the chosen games genre and the equipment used. The pilot study carried out to help plan, test, and improve my research design was also discussed. The research design is structured based on ethnographic research method guideline. Following the approval ethical consideration, the SGE was created. The SGE was designed to emulate the natural environment to the gamers and the setting was created as if the gamers were playing game at a friend's house. I chose Mario Kart from the action kart adventure genre and the Big Brain Academy from the educational game genre mainly due its compatibility to be played on both the Nintendo Wii and the Nintendo DS. The sampling method for recruiting participants was judgemental sampling whereby the researcher decided on the participant suitability to provide the data needed. The data were collected from participant observation, ethnographic interview and stimulated recall interview. Notably, all data gathered was open-ended and no guided question was given. Participants were encouraged to speak and behave freely during the gaming sessions. All data were video recorded for later transcription and analysis.

4. DATA ANALYSIS

4.1 Introduction

One of the challenges with qualitative and ethnographically informed research is the massive amount of data that the researcher needs to read through, manage, analyse, interpret, understand and reflect upon in order to develop the end story (Bazeley, 2013; Brewer, 2000; Murchison, 2010; Pole & Morrison, 2003). Brewer (2000) emphasised that upon analysing ethnographic data, the researcher has to think of the unique qualities of ethnographic data which are: "a) data come in the form of extract natural language, b) they are personal to the researcher; c) they can be generalised although they are limited in scope and d) they tend to be voluminous in scale" (p.104). Hence, this uniqueness requires the researcher to be reflective, creative, skilful, ethical and knowledgeable in designing an analysis method that is suitable for his or her research by means of referring to the guidelines provided in the literature (Mohd Hashim, 2010; Trochim & Donnelly, 2007).

The nature of interpretive research and the adaptation of an ethnographic method ensure the importance of using an appropriate rigorous process in analysing and interpreting the data collected. This chapter presents the overall strategies employed for data analysis, namely the capturing and compression process of raw video data, the analysis protocol and phases in data collection, the use of NVivo 10 (a software used in the analysis process) and a detailed discussion on issues of rigour.

4.2 Capturing and Compression of Raw Video Data

A SONY HDV 1080i/ Mini DV camera was used to capture the participants' activities during their game play sessions. The source files of the footage are stored in a mini DV

tape, which is capable of capturing up to 70 minutes of uninterrupted raw video footage. A raw video footage consists of video captured during the participants' observation sessions, which include the participants' playing the game, conversing with other participants or watching their friends playing. Some participants exceeded the maximum allotted time of 70 minutes (video tape space) and thus, a new tape was slotted in during the intervals of gaming. After the gaming sessions were complete, the source video was transferred to an Apple G4 Machine with 2.6 GHz Quad Core Processor and 6GB of RAM to run the capturing process in real time. Final Cut Express is used to capture the video. The source file was in QuickTime Movie and was converted into digital format. At the early of stage of my data collection, I found that the conversion process could not be in full 1080i HD as it is only able to run on Apple machines. Hence, to mitigate this problem, the video is reconverted to AVI format with a lower resolution and this has made it possible for the video to be viewed across Mac OS X and Windows platforms. It is worth highlighting that the process of converting and compiling took 10 minutes for every 1 minute of actual footage. Therefore, some videos took as long as 18 hours to convert.

The video was partitioned into 20 or 30 minutes to speed up the conversion process in order to avoid any loss of data during conversion due to hardware buffer overflow or any human error. Another problem faced was with the architecture of Mac that hinders the process of transferring the source data, which was very high in capacity (i.e. 20GB) to an external hard drive. A third party software package called Avangate Tuxera was purchased to solve this problem and the data was transferred to NTFS file drives.Figure 4-1 is the snapshot of the Final Cut Express to capture and convert the video data.

Figure 4-1 Snapshot of Final Cut Express

4.3 Data Analysis Protocol

There are several processes or procedures proposed in analysing qualitative research. However, literature has proven that data analysis procedures are not “generic”, and one procedure cannot be labelled as the only way to follow when conducting qualitative analysis (Creswell, 2009, p. 183; Mohd Hashim, 2010; Thomas, 2006). Similarly, there is no distinct way or formula in analysing ethnographic data (Hammersley & Atkinson, 2007, p. 158). The epistemological challenge in ethnographic analysis is the variety of approaches that can be applied or referred to (Pole & Morrison, 2003). Data analysis on ethnographic data is the process of getting to know the data, as well as getting a deep understanding on the data collected, in which researchers should be ready to go “beyond the data to develop ideas that will illuminate them” (Hammersley & Atkinson, 2007, p. 159). Researchers have to undergo a “rigorous process of representing and interpreting the deeper meaning of the data collected” (Creswell, 2009, p. 183; Taylor-Powell & Renner, 2003).

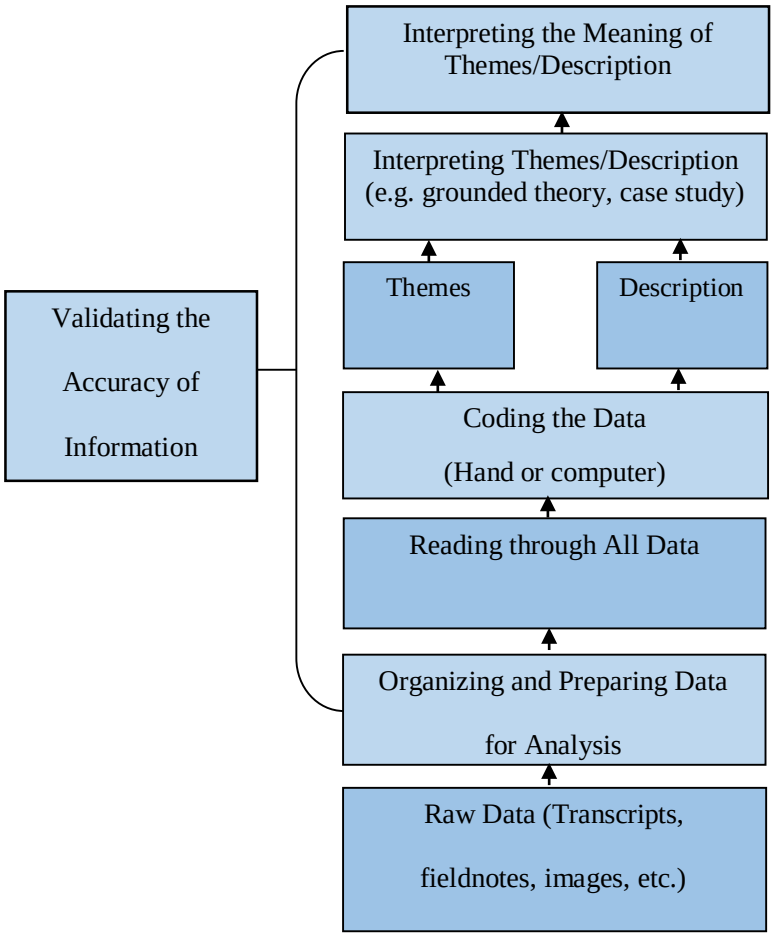


Figure 4-2 Data analysis in qualitative research: Adapted from Creswell (2009, p. 185)

It would be best for researchers to have a clear structure and protocol in interpreting the data. At the onset of the data organisation and analysis, I designed a data analysis protocol to demonstrate the general process of analysing my data. I referred to Creswell's (2009) Data Analysis in Qualitative Research Process (see Figure 4-2) to design the analysis protocol.

Figure 4-3 illustrates the general process of data analysis of my ethnographic data. This process was undertaken in parallel with data collection and stimulated recall interviews. As the analysis was performed, data collection procedures and question were improved in accordance with the new knowledge that emerged from the initial data.

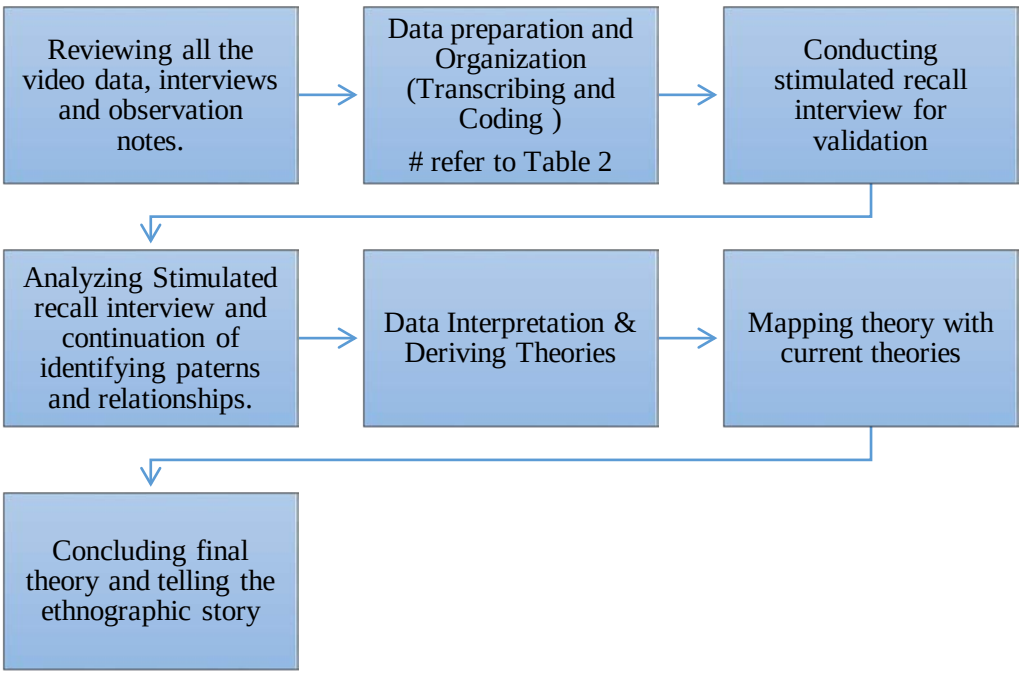


Figure 4-3 Data analysis protocol

Even though the data analysis appears to be a linear process, each process was performed iteratively. For example, step 2: Transcription and organisation was done simultaneously with data collection and therefore, some changes in enquiry and data collection procedures were made based on initial transcriptions.

4.3.1 Data Preparation and Organisation

4.3.1.1 Transcribing

I decided to transcribe the video data using NVivo 10. It was important for me to do all the transcription by myself in order to build an intimate knowledge of my data as well as being able to transcribe and translate simultaneously (Bazeley, 2013). The participant observation provided me with a large volume of video data as I felt that I needed to record as much as possible. It is worth noting that the process of transcribing the video data is time consuming. Hammersly & Atkinson (2007) stated that for video recordings,

transcribing time ratio may take up to five to one and longer. My transcription process involves transcribing all relevant behaviour, emotion, action, and comments, which are related to the present study. I refreshed my memories and referred to the field notes as I watched the video to ensure that all transcriptions of behaviour were done accurately. I followed some hermeneutic principles that were explained in detail in section 4.3.3. At times, some of the participants commented in Malay language. I decided to transcribe these comments directly into English due to the nature of Malay language that is simple and it is usually possible for a direct translation into English. Moreover, I made sure that no misinterpretation was made and the contexts and concepts of the comments remained intact. The use of NVivo 10 helped in "allowing a much faster visual scanning, transcription, coding, and retrieval of material" and having the transcription parallel to the video made it more efficient to work with (Bazeley, 2013, p. 79). Figure 4-4 and Figure 4-5 demonstrate how NVivo 10 was employed in the transcription process.

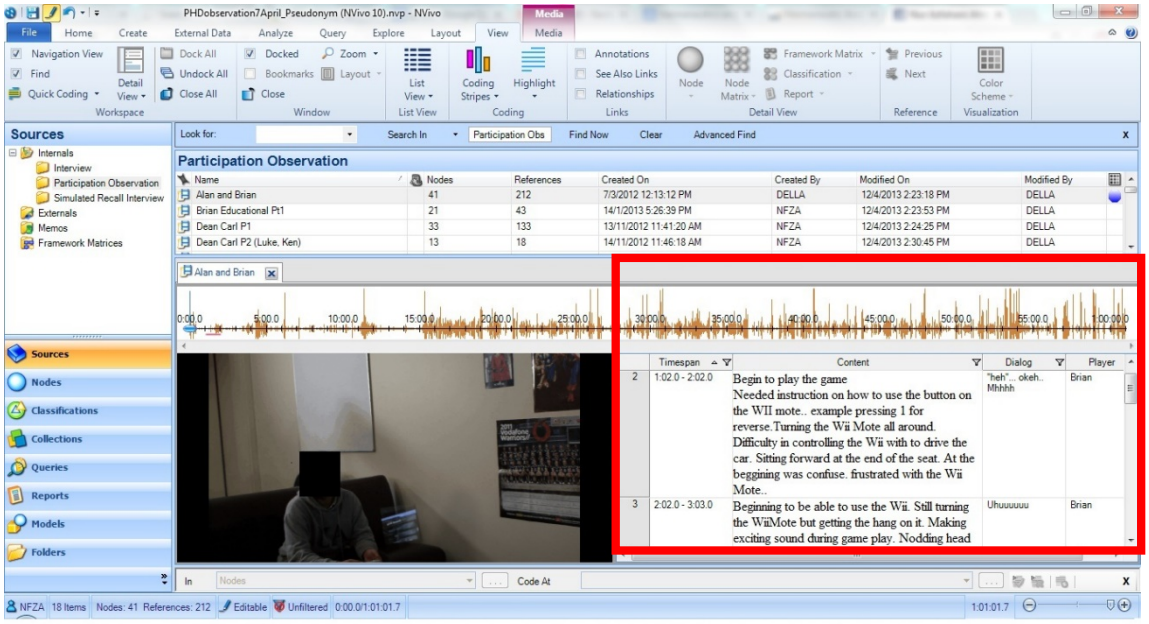


Figure 4-4 Using NVivo for transcription

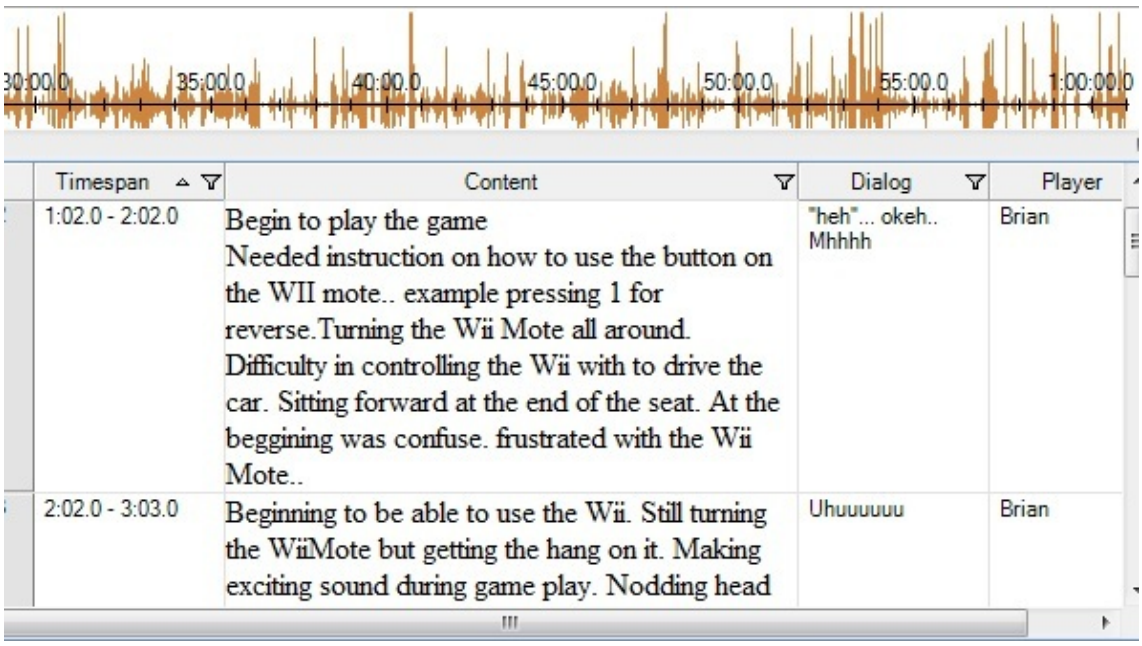


Figure 4-5 Example of video transcription

4.3.1.2 Coding

Indexing, coding or categorising are terms used in reducing and managing raw data into meaningful segments or chunks (Gibbs, 2007a). “Coding helps in the process of retrieval and searching as well as plays an active role in the process of discovery. However, it is important to keep in mind that coding does not remove the necessity to be close to the context of speech and action in the raw data.” (Hammersley & Atkinson, 2007, pp. 152 - 153).

The first objective in coding is to organise the data and identify codes that are repeated between observation data and interviews. These are the significant codes or themes. During the coding process, I had difficulty in understanding which codes to use or how to code, especially in terms of handling ethnographic data that is “everywhere and nowhere, gathering everything and nothing” (Charmaz & Mitchell, 2007, p. 161). Eventually, I began to understand that the best approach for my data analysis was an inductive data analysis approach. It began with a close reading of data, followed by

identifying important sections of data that contained meaning and creating codes/nodes for a new category that the data could be assigned to (Thomas, 2006). Braun & Clarke (2006) stated that an inductive analysis is;

> A process of coding the data without trying to fit it into a pre-existing coding frame, or the researcher's analytic preconceptions. In this sense, this form of analysis is data driven. However, it is important to note, that researchers cannot free themselves of their theoretical and epistemological commitments, and data are not coded in an epistemological vacuum (p. 12).

I referred to the following general procedure for inductive data analysis that allows the theme to emerge from the data to get a sense of how the data analysis is to be conducted (Thomas, 2006).

1) Preparation of raw data (data cleaning)
2) Close reading of the text
3) Creation of categories or themes
4) Overlapping coding and un-coded text
5) Continuing revision and refinement of category and systems.

Furthermore, I referred to the generic qualitative theoretical thematic analysis processes summarised by Braun and Clark (2006) in conducting my analysis. They listed the following steps in conducting data analysis, which I modified to suit my study as tabulated in Table 4.1: Phases of thematic analysis.

Table 4.1 Phases of thematic analysis (Adapted from (Braun & Clarke, 2006)

	Phase	**Description of the process**
1	Familiarising yourself with your data	Transcribing data (if necessary), reading and rereading the data, noting down initial ideas.
2	Generating initial codes	Coding interesting features of the data in a systematic manner across the entire data set, collating data relevant to each code.

	Phase	Description of the process
3	Searching for themes	Collating codes into potential themes, gathering all data relevant to each potential theme.
4	Reviewing themes	Checking in the themes work in relation to the coded extracts (Level 1) and the entire data set (Level 2), generating a thematic "map" of the analysis.
5	Defining and naming themes	On-going analysis to refine the specifics of each theme, and the overall story the analysis tells the theme.
6	Producing the report	The final opportunity for analysis. Selection of vivid, compelling extract examples, final analysis of selected extracts, relating back of the analysis to the research question and literature, and producing a scholarly report of the analysis.

Taking the above procedures into consideration, I generated my procedures (refer to Table 4.2) in organising my data and structuring the codes. Nvivo 10 to maintain methodological rigour. Bazeley (2007) argued that using "computer software could demonstrate rigour to the research process because the software can help maintain more comprehensive data" (p.3) and she warned that the software is meaningless without the researcher behind it. She further specified "that the computer capacity for recording, sorting, matching and linking" can help the researcher in finding the answers to the study while maintaining easy access to the raw data (p 2).

Table 4.2 Phases of generating and structuring the codes

No	Phases	Description of the process
1	Transcribing and open coding (Using Nvivo10)	Video data is transcribed and open coded following the rules of significant stated in section 4.3.1.1. Video data is open coded parallel to transcribing the data. After all the video data was open coded, all interview data and observation notes are also transcribed and open coded.
2	Creating Initial codes (Using Nvivo10)	All meaningful segments of video data, interviews and observation notes were coded as "free nodes" (Gibbs, 2007a). The nodes represent group of materials that share the same meaning, idea or concept. As this is an inductive coding or data driven, codes are developed directly while examining the data. The data was carefully read and analysed line by line (refer to Figure 4-6)
3	Phase loop	Phase 1- 2 is repeated until all video data, interview and observation notes are segmented and initial coding is completed.
4	Reviewing the Codes (Using Nvivo10)	All free nodes are then revised and evaluated for uniqueness and repetition. As the handling of massive data can

No	Phases	Description of the process
		sometimes be tedious and confusing, it is important to review the nodes and sort through any mistakes that could have been done as well as checking out any repetition of meanings or codes.
5	Grouping of Initial Codes (Using Nvivo10)	All the free nodes are then grouped together according to similarities and general concepts of creating 'tree nodes' to make groups or subgroups. Tree nodes are an arrangement of nodes into a tree structure or hierarchy (Gibbs, 2007a). I grouped my free nodes into categories that show relationship with each other. The tree nodes help me interpret the result in a more organised way (Figure 4-7).
6	Phase loop	Phases 5 and 6 are repeated until no free nodes are left and no more groups or sub groups can be formed.

After transcribing the video data, each line of the video was reviewed and was open coded in line with the rules of significance that were determined prior to the data analysis process. The codes were identified as "free nodes" in NVivo. Coding was done parallel to the transcription of the video data. Once all the video data had been imported, transcribed, and open coded in NVivo, the next step was to import, transcribe, and open code all interview data and observation notes. Figure 4-6 and Figure 4-7 indicate the codes and tree nodes in NVivo 10.

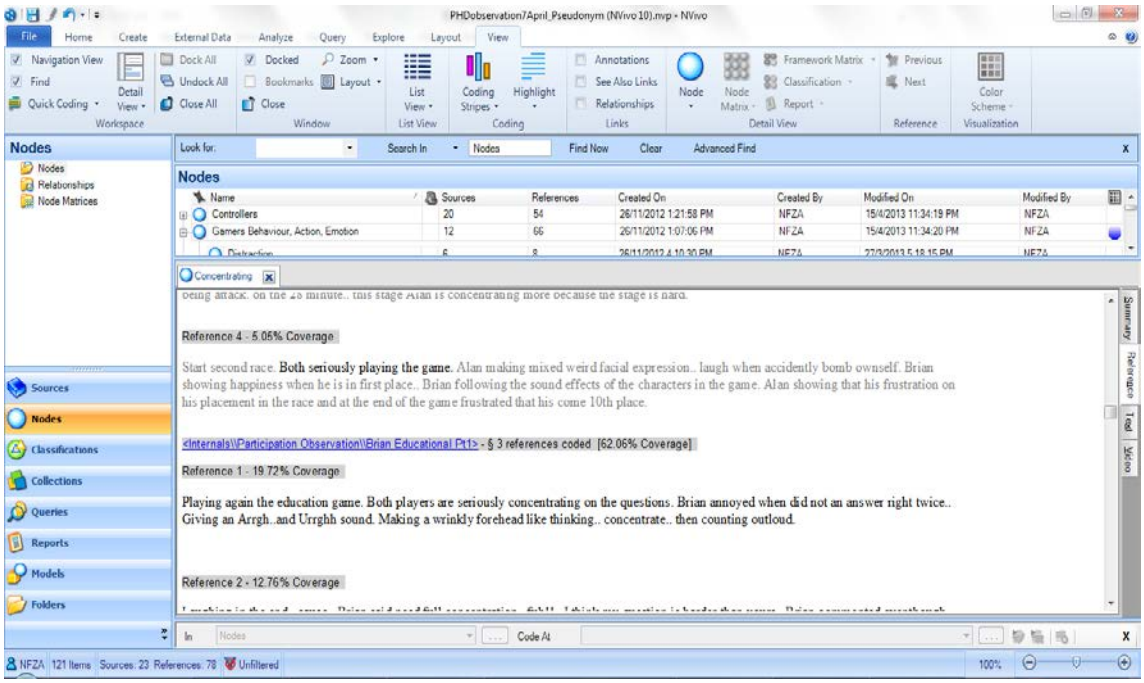


Figure 4-6 Coding done using NVivo 10

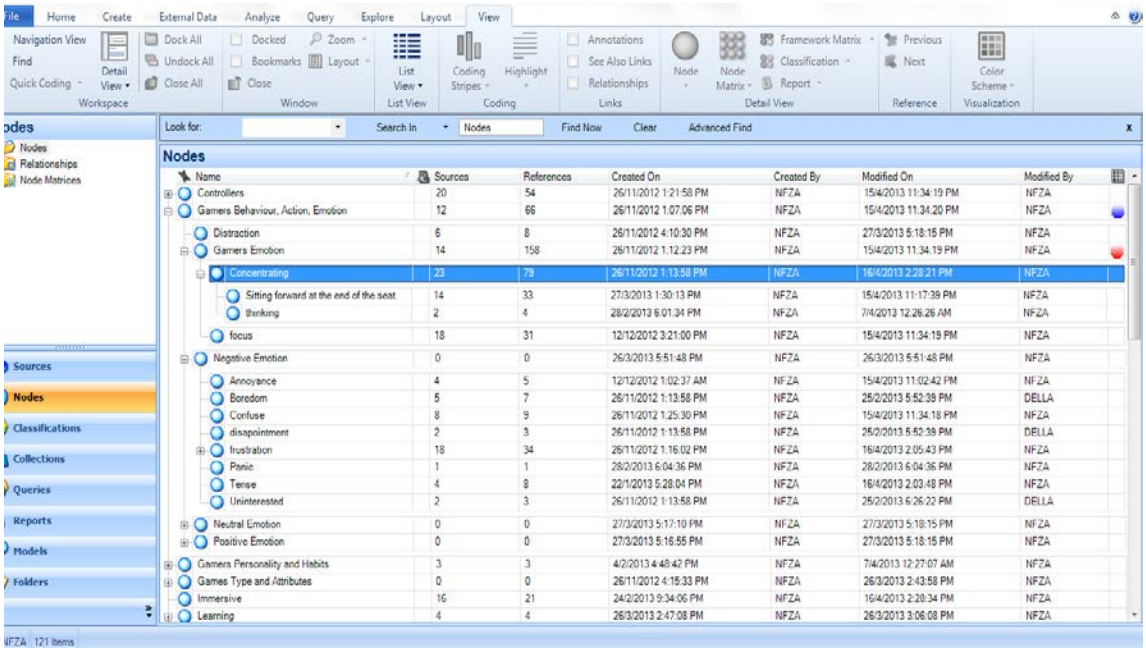


Figure 4-7 Shows the tree node that has been created after all free nodes have been identified

4.3.2 Stimulated Recall Interview for Validation

Stimulated recall interviews were conducted for transcribing, validation, and collection of additional data as discussed in section 3.7.3. After sending out emails and calling the gamers, five gamers returned to participate in the stimulated recall interview sessions. All the participants agreed and verified the transcription showed during the sessions. An interview was also conducted to verify certain aspects of the observation sessions and to encourage the gamers to add insights gained after watching the video. All interviews were then transcribed and analysed using NVivo 10. The data gained from this stimulated recall interview are used to add more insights on the theories derived from the codes.

4.3.3 Rigour of Data Analysis Significance

A number of ‘key hermeneutic principles’ were employed in the transcription of data, as well as the identification, construction, recognition, and contextualisation of codes and themes to ensure the rigorous interpretation of data. The rules of significance were

followed to ensure that relevant data were analysed. I reviewed and revised Love's (1992) recommendation that was adapted and modified by Wellington (2003) (as indicated in italic text below) to suit the context of the present study.

1) Repetition within and across interviews.

Ideas, beliefs, concerns, and issues that the g*amers* discuss repeatedly during the interview or/and are brought up at least once in an interview and are then again noted in other interviews are considered significant.

2) Level and nature of effect.

This includes emotion that is evident through nonverbal cues such as a sudden rise in vocal volume, change in facial expressions and other bodily movements noted alongside particular content lend significance to that content or theme.

3) Historical explanation, description, and interpretations.

Stories of the past that explain and justify present behaviour and meanings are considered significant.

4) Explicit and implicit interpretation.

These require connection between thoughts and activities and meanings ascribed to the *gamers* whether they are obvious and direct or implied and metaphoric. The interpretations are considered significant.

5) Serendipity

Behaviour and expressions of the *gamers* that are different from what is expected in the literature and my experience. These unexpected surprises are significant since they allow the researcher to recognise ideas, which have not been identified.

4.3.4 Data Interpretation and Deriving Theories

Nvivo 10 and Microsoft Word were used to assist in the organisation and keeping track of the messiness of the ethnographic data of the present study. Specifically, they are employed to help me handle tasks such as data storage, transcribing, and data retrieval. It is my responsibility to handle the analytical and interpretive tasks.

As regards to the analytical task, I decided which of the structured codes were important for me to interpret and use in discussing the theory. Then, I reviewed and gained better understanding of the broad context of each code and how it interrelates with other codes (Bazeley, 2013; Brewer, 2000). Murchison (2010) stated "that codes are used as a building block for researchers to analytically bridge the gap between specific examples of the codes in the ethnographic record to the big-picture questions" (p 176). He further advised that it is important for researchers to identify important research moments and experiences, as these moments can help offer greater clarity to achieve the objective of the research. In addition, a good ethnographer should be able to be a good storyteller, especially in conveying the context of the research and pinpointing experiences that are important and significant to the research.

Another point that I took into consideration is the apparent contradiction in the ethnographic data. Some contradictions in the ideas, experiences, and information were detected in the initial analysis. Surprisingly, these contradictions provided important

insights to the understanding of the research topic i.e. a "window into different perspectives among informants, potential sources or sites of conflict and debate, and even different social roles or personae that informants exhibit in different circumstances" (Murchison, 2010, p. 181). As discussed in section 5.3 and 5.4, the initial aim and assumptions of this study were originally focused on the GameFlow model. However, from the inductive data, personality types of the participants emerged. Another instance was, while I was working on the distinctive patterns of behaviour between focus and concentration, the data showed that there was a significant difference between the two (refer to section 5.5.1).

4.4 Qualitative Rigour

Rigour is of utmost importance in qualitative research to ensure the legitimacy of the research process (Tobin & Begley, 2004). It is "the means to establish trust or confidence in the findings or results of a research," (Thomas & Magilvy, 2011, p. 1). Many scholars have argued about the need of a new approach in establishing rigour in qualitative research, which focuses on the interpretive approach of the research (Lincoln & Guba, 1985; Mayan, 2009; Morse, Barrett, Mayan, Olson, & Spiers, 2002; Tobin & Begley, 2004). One of the widely referred approaches for improving rigour was suggested by Lincoln & Guba (1985). They suggested "trustworthiness" as another term for rigour since it is used to emphasise the importance of qualitative enquiry. The criteria include credibility, transferability, dependability and conformability.

Another method in interpretive research that can be used to establish rigour is 'goodness' by means of "locating situatedness, trustworthiness, and authenticity" (Tobin & Begley, 2004, p. 391). Tobin and Begley (2004) listed six elements that would demonstrate

goodness in an interpretive research: “a) foundation (epistemology and theory), b) approach (methodology), c) collection of data (method), d) presentation of voice (researcher and participant as multicultural subjects), and e) the art of meaning making (interpretation and presentation)” (p.391).

Morse et al. (2002) argued that ensuring rigour should be implemented during the qualitative research process and the importance of verification should be discussed in qualitative research as a “mechanism used during the process of research to incrementally contribute to ensuring reliability and validity” (p 9). The suggested strategies may help researchers to correct both the direction of the analysis and the development of the study as necessary. These strategies include “investigator responsiveness, methodological coherence, theoretical sampling and sampling adequacy, an active analytic stance, and saturation” (Morse et al., 2002, p. 9).

As regards the present study, I applied several strategies that were related to Lincoln and Cuba’s (1985) approach to trustworthiness and Morse et al.’s (2002) strategies of verification to ensure rigour.

4.4.1 Credibility

Credibility is an “assessment whether the findings are acceptable and if they are accurate representation of the participant or data” (Mayan, 2009, p. 102). In establishing credibility, I employed triangulation and member checking.

4.4.1.1 Triangulation

In ethnographic research, methodological triangulation is commonly used to "provide comprehensive insight" of the research (Reeves, Kuper, & Hodges, 2008, p. 514). In this study, multiple methods of data collection such as participant observation, interviews and stimulated recall interview were employed. These methods provide rich ethnographic data, which enabled me to review individual transcripts in looking for similarities within and across participants (Thomas & Magilvy, 2011) while still taking into consideration the contradicting data (Murchison, 2010). Davies (2008) stated in her book that ethnography brings greater validity than other methods in social research. Furthermore, the book explained that participant observation, "satisfies more fully most the formal criteria for ensuring validity" because its nature as a multi method data gathering method (p. 96). She continued to argue that participant observation is by nature, multi method, combining open interviews with observation and provide a deep understanding with the participants.

4.4.1.2 Member Checking

I employed members checking to enhance the trustworthiness of the data in this study. Member checking is the process in which the data or findings are reviewed by the participants (Lincoln and Guba, 1985). The procedures in clarifying interpretation of the data include, among others, alteration of meaning, correction of errors, clarification of meaning, implication of data, introduction of new topic or deletion of certain part of the transcript (Hoffart, 1991). As explicated in section 3.7.3, I requested that the gamers come again for a stimulated recall interview session, so the gamers can verify the transcription that was done. Five out of the 18 gamers agreed to attend the stimulated recall interview sessions. The sessions were run privately. The individual gamers were asked to watch the

video recording during their gaming sessions, add any comments if they have any and they were also asked to read the transcriptions. Apart from that, all five gamers were asked to review and validate the transcriptions of their own video session.

All the gamers validated and agreed with the transcription done during their gaming session. The verification from the five participants that attended the stimulated recall interview provided a benchmark that all the data was transcribed well. Subsequently, I continued with the data analysis. Following the data analysis, I inductively found a new theme that emerged from the data, which was personality type. An interview was undertaken with several gamers via email and Facebook to confirm their personality type. The gamers were given information on introverts and extroverts personality type, and they managed to identify their personality type quite clearly.

4.4.2 Transferability

Transferability is “the degree to which the findings of the research can be applied to another setting and is acquired in providing thick description of the setting and participants” (Mayan, 2009, p. 102). In the present study, all the information in relation to the data collection methods such as the strategy employed, the participant involved, the collection method involved, and the creation of the simulated gaming environment were discussed. However, it is noteworthy that the interpretive and open nature of ethnographic research might make it demanding to transfer and replicate the study exactly.

Davies (2008) argued that:

> Given the high reflexivity value of the ethnography fieldwork' it is important to begin by recognising that no ethnographic study is repeatable however acceptable to expect that a degree of overlap or agreement, and, where there is a disagreement, a reinterpretation in the light of the reflective component of the two studies that either allows for a more comprehensive understanding or a way of selecting between them, rejecting one and favouring the other (p 98).

Nevertheless, the information and knowledge provided in this study can still be referred to and transferred for readers to evaluate and use to their benefit.

4.4.3 Dependability and Conformability

Dependability is the assessment of the quality of research design. This includes the specific purpose of the study, how and why the participants were selected, the data collection method, data analysis process, interpretation of results and findings as well as techniques in establishing rigour (Tengku Kasim, 2012; Thomas & Magilvy, 2011). On the other hand, conformability is a measure of how well the findings are supported by the data collected (Lincoln & Guba, 1985).

In order to ensure that the dependability and conformability issues are addressed, the research design of this study has been reported in chapter 3 (Research Design) including the data gathering method procedures (see section 3.7). The data analysis protocol and detailed description on how the findings emerged from the data were also explained in detail in section 4.3.

In addition, I followed a few of Morse et al.'s (2002) strategies in ensuring rigour during the actual conduct of the study. The first strategy that I employed was "Investigator Responsiveness". This strategy deals with the researcher's creativity, sensitivity,

flexibility and skill, which are of utmost importance in verifying the research process. It has to be noted that in ethnographic research, the ethnographer is the instrument in collecting data. As the researcher, I was carefully involved in the participant observation, conducting open-ended conversational style interviews and being flexible during the gaming session in accordance with the participants' preferences and the information given by the participants. The gaming sessions were flexible in terms of the freedom for the participants to choose which game to try or which console (screen size) to play first. In addition, they are given the freedom to play as long as they want when they arrived at the SGE.

The second strategy employed was "Methodological Coherence" which "is to ensure the congruence between the research question and the components of the method" (Morse et al., 2002, p. 12). A few changes to the main research question, the observation protocols and the interview questions were made due to the iterative process of the data collection method and data analysis. Morse et al. (2002) and Murchison (2010) stated that the research question or the method in this type of research might have to be modified as new data emerged. As indicated in Chapter 3, a few changes were made during the data gathering. For instance, the game genre offered was changed due to its unpopularity among the participants, the talk-aloud method was removed because it distracts the gaming sessions, the short interval interviews were not enforced to all participants due to gamers immersion and the observation scenarios vary depending on the participants' appointments and preferences.

The sampling method must be appropriate to the research, hence the third strategy employed was "Sampling". I used purposive sampling and snowball sampling methods in this study to help obtain the most suitable participants. To reiterate, the most suitable

participants were chosen for this research to ensure that the researcher will obtain the required information, as mentioned in section 3.6.

4.5 Chapter Summary

This chapter describes the overall process employed in handling, segmenting, organising, and interpreting the ethnographic data of this study. This includes data capturing and converting procedures, the analysis protocol, the transcribing and coding process, the process of identifying patterns and relationships, and the data interpretation process. Moreover, the steps involved to establish rigour in this study were discussed.

After capturing and compressing the video, Nvivo 10 was employed to transcribe the raw data carefully and comprehensively. An inductive approach was utilized to analyse the data for this study. I manage to derive themes that emerged from the data by means of using thematic analysis. Then, the data were coded and organized into cluster of themes. The process was looped until all parallel codes and themes were categorized into meaningful major themes. The credibility, transferability, and dependability and conformity criteria for a rigorous qualitative research were discussed to ensure the legitimacy of the research process. Notably, the data analysis was successful, and two major themes emerged from the data namely the type of gamers and enjoyment element of gaming. The results of this study will be discussed in the following chapter, i.e. Chapter 5.

5. THE ETHNOGRAPHIC STORY AND RESULTS

5.1 Introduction

This chapter elucidates the context and the ethnographic process of this research. Additionally, it sets to describe how the understanding of gamers' behaviour during game play was developed, including my interpretation of the situation. The different experiences that occurred during my observational study are also described. As an ethnographer, I have to remind the reader that this is my interpretation of data and my 'truth'.

As explained by Narayan (1993):

> Ethnographers would most certainly be better off looking for the natives' point of view to realise their visions of their worlds while at the same time acknowledging that the ethnographer do not speak from a position outside of their world but are implicated in them too through field work, political relations and a variety of global flows. (p. 676).

Drager (2009) stated that:

> Ethnographers are not objective, our present and previous biases are inseparable from our selves. The "results are only 'true' in so far they are understood in relation to ourselves being implemented with the reality of the community we are trying to describe" (p. 29).

It is noteworthy that the deep understanding on my interest, the background underpinning this research and the overall story behind the observational process will shed light on the overall content of the data acquired.

I will begin the ethnographic story by providing insights on the SGE. Ultimately, I will discuss how SGE has been proven to be a natural environment and this is supported by the gamers and can thus be considered as a "field" for ethnographic research.

5.2 The Simulated Gaming Environment

In chapter four, I discussed the reasons for using a simulated gaming environment in this study. For gamers, the natural gaming environment could be anywhere such as the gamers' own room, a friend's house, the cybercafé, or even on a bus (when playing handheld consoles). A gamer who enjoys a game may be immersed in the game and this allows the possibility to play game anywhere. For the purpose of this ethnographically - informed study, I have created an SGE in the HCI lab at AUT. In this section, I will describe the scenario and comments that were made by the gamers who confirmed that my SGE was successful in providing the gamers a natural environment.

At the beginning of the sessions, some gamers seemed apprehensive about the environment surrounding them. The gamers waited for me at the building reception in order to gain access to the building. It is worth noting that the surrounding area of the room is an office environment. Then, I showed them the gaming environment, which includes the game consoles and the games that they would be participating in. Once the formalities were over, the gamers started playing a game.

After the completing the gaming sessions, all the participants agreed that the SGE environment was a natural environment for them. They commented that it is like playing at either a friend's house or at their own house. The only suggestion made was that to take note of the lighting of the room. This is because a few gamers commented that they prefer playing in a darker environment, which prompted me to begin a session by asking if they would like the room to be darker or brighter. Surprisingly, most of the gamers preferred a darker environment. Hence, a "batlight" was installed as an ambient up light. A 'batlight' is a flood light normally used for photos, set to low power, with a bat symbol

affixed to the surface. A few comments made by the gamers on the SGE as well as having the video camera present during the gaming sessions are as follows.

> *"I was quite nervous in the beginning, then I was comfortable with the chair. After a while I did not feel that I was in a made up environment. The presence of the camera did not bother me at all. I was not aware of it.*" [George]
>
> *"I like the environment. I did not feel like in a testing area. I feel like at home with friends especially having friends cheering." [Harold]*
>
> *"I was not aware of the surrounding and the videotaping that was involved. I was more focused on the game play*." [Ken]
>
> *"At first I was a bit nervous entering the lab but when I step into the environment and sit on the sofa. I was more excited in choosing what game to play"*. [Mike]
>
> *"I feel comfortable playing game here. I feel relax as if I'm at home. Love sitting on the sofa playing."* [Peter]

Apart from the comments made by the participants, my observation indicated that the gamers were enjoying themselves in a gaming environment. They were shouting and laughing out loud throughout some of the sessions. Notably, one gamer took off his shoes during a session, showing that he was comfortable in the room. For every visit, most gamers spent more than three hours in the room either watching a person playing the game or participating in the game. Throughout the sessions, cheers and heckling could be heard.

One of the gamers, Dean, felt reluctant to spend a long time when I first called him to confirm his appointment for the sessions. Surprisingly, he ended up spending seven hours in the SGE and he was surprised that he lost track of time. A few gamers like Alan, Brian, and Peter came for multiple sessions to participate and to become spectators. Alan and Brian also came back once to try the KINECT. I noticed that after a while some postgraduate students (who were not involved in my study) came to spend time, usually

after office hours to play games in the SGE. They were seen to comfortably put their legs on the table and having fun.

From the above comments and observation, it can be concluded that the SGE created for this study was a successful “field” for this study.

5.2.1 Understanding the Gameplay

The two games used in the present study are Mario Kart and Big Brain Academy, which are available in the Wii and DS platforms. The core of the gameplay for both games is similar but with minor differences from both console versions. The main objective of Mario Kart, an action kart racing game, is to reach the finish line by any means necessary. The players were given the option to choose their character and type of kart at the beginning of each race. The different character affects the weight, speed, and handling of each kart. It has to be noted that most of the participants in this study chose their characters based on the look of the kart. The players press the A button to accelerate during the start of each race. In each race, item boxes, which consist of offensive and defensive weapons are scattered throughout the track. The players who were left behind will be given offensive weapons to catch up with the leader of the race. The players who are leading the game will receive defensive weapons to block their opponents from winning. This is to ensure that this game can cater to both the expert and novice players. Furthermore, the game allows the players to play on single player or multiplayer mode. The players will race against the characters chosen by the computer in single player mode and the screen displays a whole screen just for the participant. Figure 5-1 shows the single player mode screen shot for Mario Kart Wii.

Figure 5-1 Single player screen shot for Mario Kart Wii

In multiplayer mode, the Wii version of Mario Kart can support up to four players simultaneously. The screen will be split into 4 smaller sections to allow all players to see their own character racing. Figure 5-2 illustrates the multiplayer mode screenshot for Mario Kart Wii.

Figure 5-2 Multiplayer screen shot for Mariokart Wii

The controls of the Wii and DS versions of Mario Kart are quite similar. The only difference is that the Wii version uses the player's physical movement of the controller to steer the racers. This is shown in Figure 5-3 and Figure 5-4.

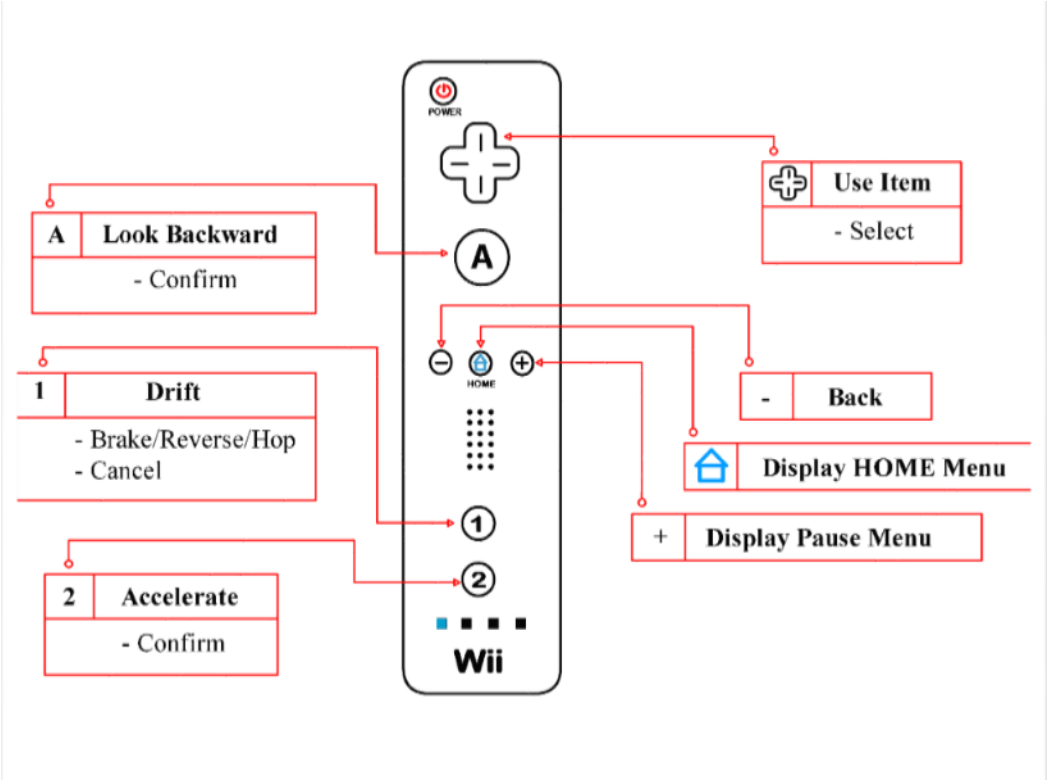


Figure 5-3 Mario Kart Wii remote control front

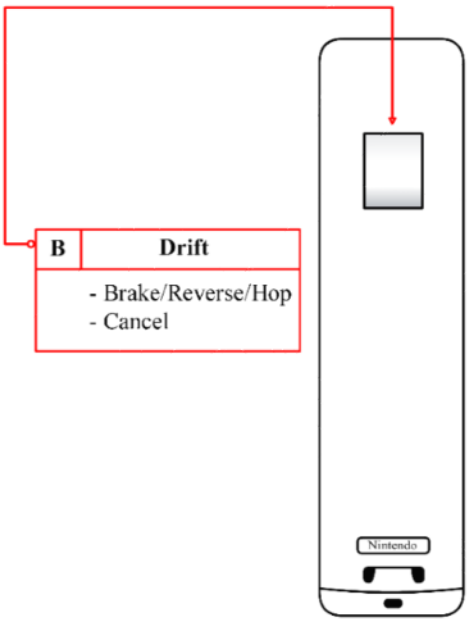


Figure 5-4 Mario Kart Wii remote control back

As shown in Figure 5-5, the DS screens show the gameplay on the top part of the screen, while the bottom part of the screen displays the track map with all the other players. Single player mode is also available with the DS version as the player will be racing with the computer. The DS version of the game can support up to eight players locally. Different from the Wii, the DS screen display is identical for both single player and multiplayer mode. Figure 5-6 shows the screen shot of playing Mario Kart on the DS.

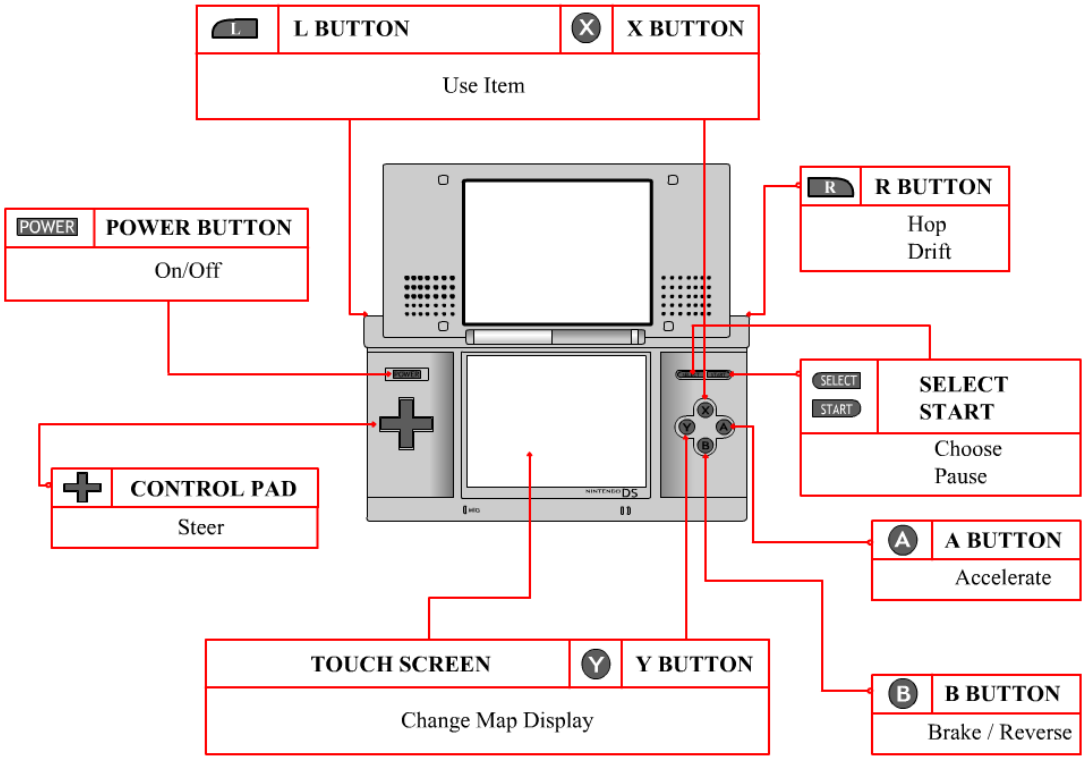


Figure 5-5 Mario Kart DS control

Figure 5-6 Screen shot of Mario Kart on the DS

The second game used in the present study was the Big Brain Academy for both the Wii and DS. It is an educational game as players gauge their brainpower by solving puzzles in a short allotted time. The game is divided into five categories namely identify, memorise, analyse, compute and visualise. At the end of each test, players are graded on how fast and accurately they solve each puzzle. Then, the results are saved for future improvement. When the players mastered each category, the level of difficulty will increase and the time will be shortened.

The participants have to register their particulars such as name, age and sex to start the game. The game will then prompt the participants on what their current brain score should be. This is followed by a series of questions based on the five different categories that

need to be answered by the players. The game will then calculate the current ‘brain’ score of the participant. Interestingly, the participants have the option to retake the test again to improve their ‘brain’ score. The game controls are a basic point and click feature and the participants will use the Wiimote to point at the screen and press A to select the preferred option. As regards the Big Brain Academy DS, the players will use a stylus to control the game. An additional feature in the DS version is that the series of questions given must be completed within a specific time limit. This increases the gameplay challenge for Big Brain Academy DS. The screen shot of playing Big Brain Academy DS is presented in Figure 5-7.

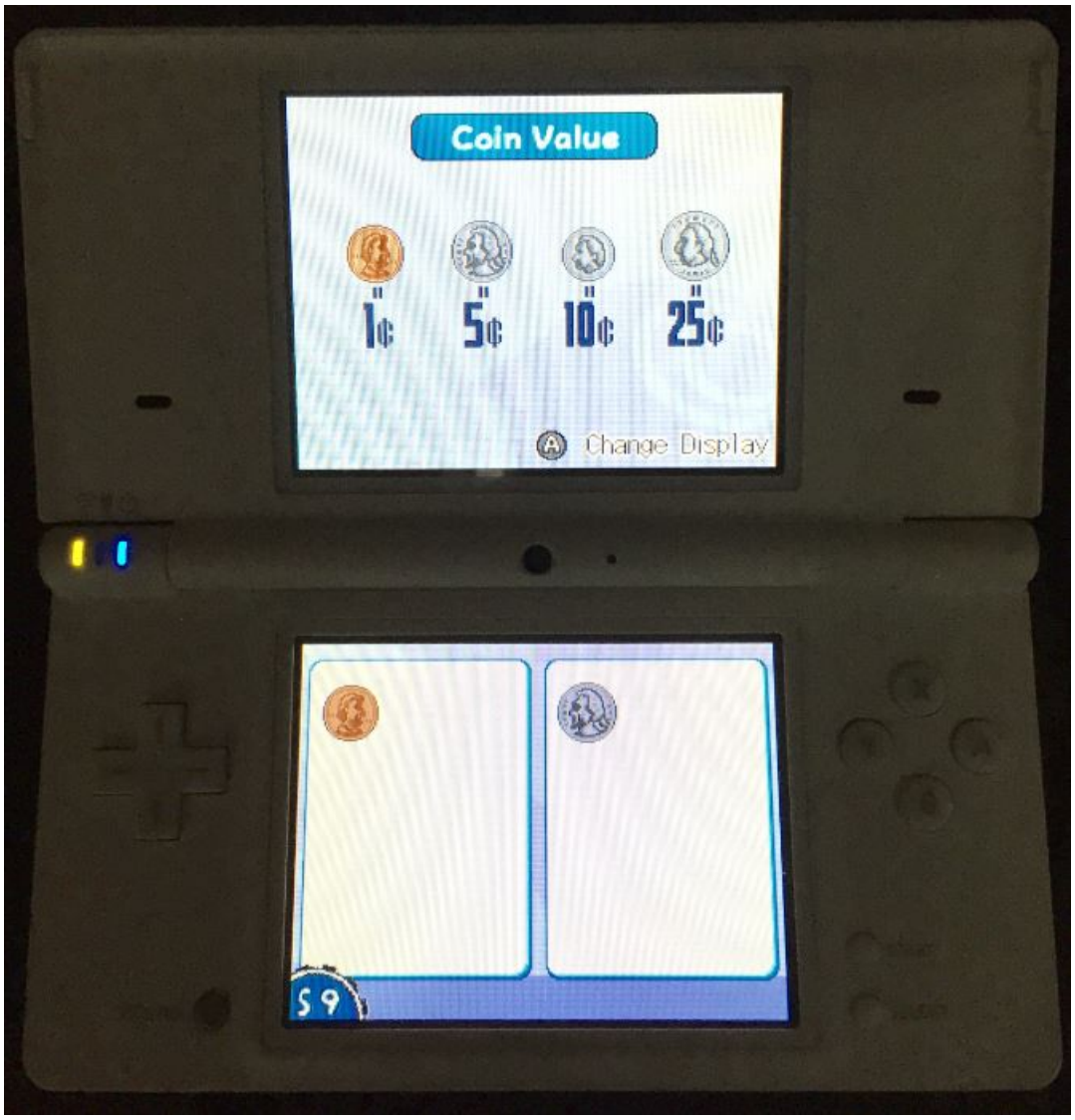


Figure 5-7 Screen Shot for Big Brain Academy DS

With regard to the present study, most of the participants find the game intuitive and easy to use. A second player can join in for multiplayer mode after a player finishes the single player element of a game. The multiplayer mode for Big Brain Academy is only available in the Wii. The multiplayer element of the game involves a split screen competitive mode, in which both players have to answer 20 random questions from five categories. Players can customise the game with a specific set of goals and objectives. Figure 5-8 shows the single player mode for Big Brain Academy Wii, and Figure 5-9 shows the multiplayer mode for Big Brain Academy Wii.

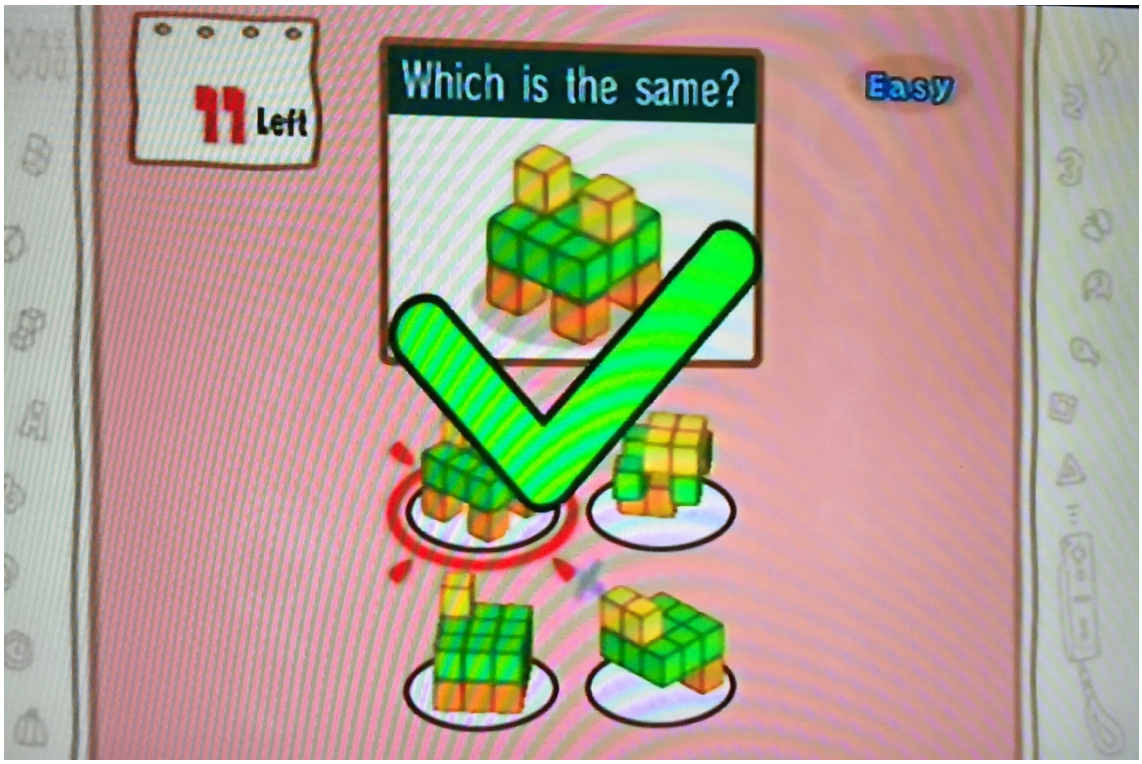


Figure 5-8 Single player Mode for Big Brain Academy Wii

Figure 5-9 Multiplayer mode for Big Brain Academy Wii

5.3 The beginning of this journey and the outcome of the study

The essence of a good ethnographically-informed study is the understanding and getting immersed in the culture. With regards to this study, I would rate myself a novice gamer. I am more inclined to certain types of games such as puzzle games (i.e. Tetris, The Room, Pac Man, Bubble Mania, WarioWare) that are more of a brainteaser. Most of the games that I play are on mobile phone, tablet and handheld consoles. Sometimes, I play games of other genres such as first-person shooter games or fighting games but I am not particularly good at them.

However, I have the privilege to mingle a lot with hard-core gamers. For the past nine years, I have been an attentive observer, occasionally joining in multiplayer games (occasionally because I am bad at certain types of games) and having an enjoyable time entertaining my spouse's friends. He (my spouse) has been playing console games since he was 10 years old and has indirectly introduced me to the world of gaming. I have always been interested and enjoyed observing him and his friends having fun playing

console games. They would spend hours and even days trying to finish certain types of games. Having such a background, I have been immersed in the world of gaming. I believe that I blended well in this study since I felt comfortable joining in the gaming environment as well as conversing with the gamers invited to participate in this study.

As mentioned in section 5.2, the gamers arrived at the SGE feeling slightly self-conscious and looked around the office space around them. I invited the gamers to sit on the sofa or anywhere in the SGE that they feel comfortable with after the formalities (signing consent forms and reading the information sheet). I started asking about their demographic information such as how long have they play a game, what game do they like to play, and what kind of consoles they prefer to play to help put them at their ease. Based on my observation, they were usually excited talking about what games or consoles interest them the most. Before recording the video sessions, I reconfirmed their permission and reminded them to play the game and have a good time. The sessions began when the gamer chose the game they want to play.

During the sessions, I took note on what I observed and the comments made by the gamers. At the end of each session, the gamers were asked to comment about the game and how they felt. Also, they were asked if they wanted to continue the game, try another game, or if they have to leave. For the purpose of this study, I encouraged them to try both Mario Kart and Big Brain Academy on Wii and DS. The gaming sessions would only end once the gamers needed to go home.

Upon analysing, coding, categorising, and reflecting on the data gathered, I identified two main themes that can be discussed for the present study. The first theme is on extrovert and introvert gamers and the effect of screen size on these gamers. The inductive data

emerged from the behaviour of the gamers. I started by categorising the gamers according to their actions, verbal comments, and the emotions they displayed. The data analysis codes divided the gamers as expressive gamers and quiet gamers. Based on the literature and discussion with my supervisors, I found that these gamers can be divided into two personality types namely Introvert and Extrovert. The noisy, loud and expressive gamers were categorised as Extrovert Gamers while the quiet, deep thinkers and serious gamers were categorised as Introvert Gamers. They were reviewed in line with each scenario (mode of play) they participated. I analysed all the players' behaviour, comments, and emotions that were displayed while playing on a big screen, small screen, single player, multiplayer, Mario Kart, or educational game. Subsequently, member checking was undertaken to some of the gamers by means of asking them if they were an introvert or an extrovert personality type. Therefore, I argue that the motivation of playing a game on a particular screen size depends on the personality type of the gamer.

The second theme is enjoyment in playing the game and the role screen size plays in the enjoyment factors of gaming. This theme is divided into five subthemes: 1) Focus and concentration, 2) Challenge, 3) Immersion, 4) Control, and 5) Social Engagement

The next section of this chapter discussed the findings of the present study. The findings will be supported with a few participant observation sessions that were significant in this present study. Sessions that were most representative of the data for this study were chosen. These sessions also represent gamers who spend hours and came for repetitive visits. I relate these sessions as a guide on how I derived the findings for this present study.

5.4 Understanding the Gamers (Extrovert and Introvert Gamers)

It is evident from my observation that there are two distinctive types of gamers: the extrovert and the introvert. The first finding of this study is the effect/relationship of screen size on extrovert and introvert gamers. This section will separately discuss the two types of gamers. The discussion begins with a narrative on the participants' observation sessions and end with a summary on the different scenarios of these group of gamers, which is interpreted in terms of screen size.

5.4.1 Extrovert Gamers

The term extrovert was used by Jung, which indicates that extroverts are characterised by their interest in people and things, a relationship with them and a dependence on them (Jung's Psychological Types, 2009). Brownfield (1993) further explained, "…people who prefer extraversion tend to focus on the outer world of people and things…" (p. 8). The participant observation sessions below demonstrate some of the data used to draw conclusion on extrovert gamers and their preference for big screen gameplay.

5.4.1.1 Participant Observation Sessions with Brian, John, and Alan (Extrovert Gamers)

Single Player Session Playing Mario Kart Wii and Mario Kart DS [Brian]

Brian entered the SGE with a big smile on his face and he was excited to start the session. Brian loved playing games and was thrilled upon seeing the 40-inch television for him to try the Nintendo Wii. Brian is a jovial guy, laughing and making jokes with me. He told me that he is an old school gamer as he has around 15 years of gaming experience and he has been playing games since he was a little kid. He tried most of the consoles and he likes the PlayStation 3 the most because he likes to play football and first-person shooter

games. He is also familiar with the Nintendo DS and plays strategy games such as 'Black and White' and 'Sims City' on the computer. However, he has never tried the Nintendo Wii.

He started the session by trying out the single player game on the big screen using the Nintendo Wii. He asked for some basic instructions on how to play the game and how to use the Wiimote. He sat at the edge of the sofa facing the big screen. He showed frustration by scrunching his forehead, making *'ish', 'aah'* sounds during the first game. He was annoyed and confused having to control the karts using the Wiimote controller as he clearly voiced out his frustration, *"This controller is really sensitive"*. He lost the first race and was eager to try again. This was repeated for another four races and he was happy that he was getting better with the controller. He started to put his full concentration on the screen. After a race, he kept muttering to himself that, *"I must win, I must win the next race"*.

John, another gamer, was there watching Brian playing the game as John was used to the controller and is an expert with the game. He decided to teach Brian playing the game until Brian was comfortable with the game. John felt that it would be unfair to Brian if he competes with him before giving Brian a chance to practice. John was not a quiet audience though; he gave instructions, laughed and joked around with Brian on some occasions. Surprisingly, this did not annoy Brian and he showed that he liked having a friend there to watch him play.

I observed their behaviour and smiled at the remarks made by them. Sometimes, I cheered and gave supportive comments. I also answered any questions he had with regard to the game or responding to Brian's jokes and laughter. I jotted down my observation and the

video was recording. Moreover, I also noticed that Brian is a very expressive gamer, he stomped his feet and laughed loudly when he made mistakes or was attacked by another player. He even shouted at the game and he followed the action in the game. For instance, when the car bounced on a mushroom, he would be jumping and nodding his head as if he was bouncing. He hummed and sang along to the sound effect or music in the game and truly immersed himself in the environment. The comments made by Brian during gameplay sessions were mostly about his dissatisfaction with the Wiimote.

Brian tried playing Mario Kart on the Nintendo DS (small screen) after he was satisfied playing the Nintendo Wii on the big screen. He was more comfortable with the controller as he commented, "*I'm an old school gamer, I'm used to using joy sticks and arrow pads*". I observed that even on the small screen, he was still the same talkative gamer, and motivated to try again until he wins. However, he was quieter and did not shout or laugh that much, but he did smile throughout the game. Even when using a handheld console, he still sat on the sofa while concentrating and focusing on the screen.

When Brian played with the Nintendo DS, it was harder for John and me to see his gameplay. In the middle of the game, John decided to look through Brian's shoulder to see how Brian was playing. John did not made many comments during this gameplay session except for explaining the game graphics and car type. Brian found that playing on the DS was easier to win the race. However, Brian concluded at the end of the game that he preferred playing this game on the big screen. He said, "*The bigger the screen the better it is. Usually games created for the big screen have better features and better screen view*".

An excerpt of his comments and open-ended interview session is tabulated in Table 5.1. Brian was among the gamers who came to the SGE more than seven times to play and try the games.

Table 5.1 Brian comments and interview sessions

Question (The Researcher)	**Response (Brian)**
Do you have any comments or anything to share about your experience/feelings during the gameplay?	*The bigger the screen the better it is. Usually games created for the big screen has better features and better screen view, but for this game the function bird eye view is not there. Using the bird eye view, I could see the road ahead so I can aspect when to start drifting. On a big screen you can also see the detail of the graphics.* *Oh. PSP is also nice to play with, mostly because its' portable.*
Why were you turning the Wiimote around and around?	*I was having trouble with the Wiimote. It did not do what I was imagine it to do. I imagine it was like driving a car. I feel frustrated and confused with the Wiimote.*
You were also stamping your feet a lot? Can you describe the reason for this?	*I was frustrated with the characters that keep holding his car back. I was also excited.*
I noticed you sat at the edge of the seat when playing the game. Why is that?	*I was feeling excited and it's the way I sit when driving the car. It also happens when I'm concentrating on the game.*
Why were you nodding to the music or the action in the game?	*I felt like imitating and following the camera view. I was feeling immersed with the character and the race.*
How do you feel when other people are watching you playing?	*Having an audience does not affect me because I'm used to play in the arcades where a lot of people is watching. It's always good to have friends around.*

Multiplayer Session Playing Mario Kart Wii and Mario Kart DS [Alan, Brian, and John]

In the multiplayer session, the gamers sat on the sofa next to each other. If there were more than three players, one gamer has to pull out a single chair and they would all sit in a row. Brian was already comfortable in the room when Alan arrived for his gaming session and Alan wanted to play multiplayer immediately. However, Brian had a few practice runs on his own. Alan was an expressive gamer, laughing, making jokes, and shouting during his single player session. In the middle of the session he took off his

shoes, he explained that it is more comfortable for him to remove his shoes. He was more comfortable with the Wiimote even though he was not familiar with the Nintendo Wii. He insisted on playing multiplayer after a few trial runs playing the game.

The multiplayer session was really noisy. Alan and Brian were really competitive, goading each other and bragging that they will win the race. There was a lot of laughter, shouting, jumping up from the chair, cursing and playing mental games with each other. The game got a bit more interesting when John decided to join. Being the most expert gamer for this game, Alan and Brian were determined to try beating John but it was really hard. In one race, John arrived to the finish line quite early but only crossed over the winning line when Brian was near him. John gave a bow of victory to the other gamers and there was lots of cursing and laughter. Alan and Brian had to really concentrate on the game since it was rather tricky for them with the split screen features. Moreover, Alan was confused with certain parts of the game and after a few races, Alan became more comfortable with the screen. During the session, all the three gamers were sitting in front of the sofa. Once their race ended, the gamers seemed laid-back and sometimes took a relaxing deep breath.

After playing a few rounds on the big screen, I suggested that they try multiplayer on the small screen. Alan and Brian started getting comfortable, slouching a bit back on the sofa while choosing the cars and character of the game. John chose to watch Alan play. They began by trying out the controllers on the DS and checking the location of the buttons while asking John which button does what. Even though Brian was familiar with the DS, he needed a little more clarification on the gameplay controls for Mario Kart. Alan and Brian were really focused on the game once the race started. They were not so noisy in the beginning and Brian was asking which position was Alan in the race "*Where are you?*

If it was on the big screen, I can just glance at your screen". Alan answered "*No 6 in the race...*" "*Where are you?*" "*No 3...*" said Brian and then they were quiet. Once Brian and Alan neared the finishing line, they got a bit noisier because they were running really closed to each other. Both shouted in the end; Brian, because he won and Alan, because he was so close to winning. Interestingly, the multiplayer game continued for another four to six races. Alan wanted to continue until he won a lot of races since Brian kept on winning. Brain on the other hand was always excited to maintain his position as a winner. The environment became noisier after each gaming session.

5.4.1.2 Participant Observation Sessions with Brian and John (Extrovert Gamers)

Education Game (Big Brain Academy Wii and Big Brain Academy DS) Single Player [Brian]

In another session, Brian came again to the SGE to try the Big Brain Academy game. He was familiar and comfortable with the environment since it was his fourth visit to the SGE. Once the game was set up and instruction on how to use the Wiimote for this game was given, Brian sat comfortably but leant forward. He was a bit annoyed at the beginning of the game as the professor character of the game took a long time to introduce the game without offering a skip button option. After all the instructions and settings were given, Brian tried the question. While playing the game and answering the questions, he was quieter than he usually is. He did laugh and bite his fingers when making mistakes answering the questions. He showed full concentration during the quiz sessions. After finished answering the entire questions, he was anticipating the grade that he would get and laughed when he got a C. He wanted to try again and stated that the first time was only a trial run to get him familiar with the game. He started the next session with ease; more relaxed but with full concentration. He was happy and laughed when the grade increased from C to C+. He did not find any problem with the Wiimote for this game.

However, he did comment that the game was a bit boring and he would not play the game at home or buy it for himself.

The next session was using the Nintendo DS and Brian was really serious, focusing hard on the screen. He did not make any noise, just small *"ish"* and *"aah"* when he made mistakes. Some of the questions in this game were confusing, which is evidenced when he made a few confused facial expressions. He was happy with the grade that he got especially when it was higher than his grade when playing the Nintendo Wii, which was a C+. He commented that the game was more challenging on the DS because of the timer, which urged him to think fast. Apart from that, he is more familiar with the controllers on the DS which uses a stylus and touch screen. He requested to try another session to improve the grade. Unfortunately, he remained on the same grade in another session.

Education Game (Big Brain Academy DS) Multiplayer on the Big Screen

Brian wanted to try the multiplayer session. However, there was no other player available to play with him at that moment. So, I participated in the gaming session. When playing multiplayer on the big screen, the screen will split into two. The gamers have to race and answer the questions quickly. The first to reach the finish line is the winner. During this session, both of us were quiet and only a few cursing sounds were heard if a mistake was made. I felt the pressure when I made mistake. After reviewing the video, I noticed that both of us were smiling throughout the race. After the race finished, we sighed or shouted depending on who won. Brian won all the three races but it was a close game as in all games he won by only one question. I was frustrated for losing by just one question. Brian mentioned that it was really challenging and more fun to play multiplayer. He also mentioned that he needed to give his full attention to this game. *"Fuh! Need full*

concentration. Cannot talk at all when playing the game. If you do you lose your concentration."

5.4.1.3 My Reflection on the Extrovert Gamers Playing Mario Kart Wii and DS

It is worth noting that Mario Kart is a game created for fun and competition. I tried the game personally and had a good time playing it. Nevertheless, I had difficulty controlling the car either using a Wiimote or the arrow button controller for the DS. Sad to say, I never win. Putting aside my personal skill in playing this game, I observed Alan, Brian, John and other gamers playing scenario. Most extrovert gamers have the same characteristic manifested when playing on the big screen. Here, I enlisted the characteristics that made Mario Kart Wii more enjoyable on the big screen by extrovert gamers.

1) Extrovert gamers prefer to play a game that provides a lot of social interaction.
2) During single player game, extrovert gamers show more excitement when there is audience watching him/her play the game.
3) During single player game, extrovert gamers are encouraged by cheers and heckling during the gameplay sessions.
4) During single player game, extrovert gamers feel more satisfied when they are able to express their emotion, talk, and laugh.
5) During multiplayer game, extrovert gamers prefer to see his/her opponents' screen to increase the competition and social interaction.

5.4.1.4 My Reflection on the Extrovert Gamers Playing Education Game Big Brain Academy Wii and DS

Upon observing Brian (extrovert gamer), I noticed that there is a little difference in the preference of playing the game on big or small screen. In terms of his enjoyment in playing this game, Brian was not affected by the screen size. He had the same motivation to play the game, i.e. to improve himself, and his reaction to the gameplay was the same. However, he did comment that it was more fun playing on the big screen if there is a friend around. Also, he said that the game was more challenging on the small screen because of the timer feature. He further stated that both controllers were comfortable to use when playing this game but he is more familiar with the stylus and the touch screen. I also noticed that he preferred the multiplayer sessions of the game and I could not compare this with small screen due to some technical issues with playing multiplayer using the DS for this game.

Therefore, based on my observation with Brian and a few other extrovert gamers who tried Big Brain Academy on the Wii and the DS, my conclusions for this scenario of playing educational games on the Wii and the DS are as the following:

1) As long as the level of challenge is appropriate, the screen size does not have a big impact on extrovert gamers.
2) The interactivity of the big screen in terms of graphics and controller can make the game session more fun for extrovert gamers.
3) Having an audience and competing with another player is more enjoyable and motivating to an extrovert gamer when playing educational games. This is more feasible on the big screen.

5.4.2 Introvert Gamers

Jung characterised introverts as an inward flowing of personal energy, a withdrawal concentrating on subjective factors and prefer reflections to activity (Jung's Psychological Types, 2009). Brownfield (1993) stated in her study that "people who are introvert are motivated by their inner worlds not needing a lot of outside energy to drive their interest" (p.8).

The following sections delineate the scenarios during participant observation sessions that were conducted with an introvert gamer. The findings that I deduced from the observation with regards to introverts and their preferred screen size are also discussed.

5.4.2.1 Participant Observation Sessions with Fred (Introvert Gamers)

Single Player Session Playing Mario Kart Wii and Mario Kart DS

I met Fred in a gathering we had among postgraduate students. I found out that he is a gamer through our conversation. Fred is the 4th participant who volunteered to participate in this study. Fred is used to playing computer games and the PS3. He prefers playing games alone and games that require a lot of thinking such as strategy games.

As usual, the session started with introducing the players on the process, reading the information sheet and signing the consent form. I asked Fred about the environment and he mentioned that he prefers the room to be darker. Hence, I switched off the lights at the gaming section of the room. He further commented that when playing games, a darker room is better so that you will get immersed in the game. We started the session by playing Mario Kart Wii. Fred was not familiar with the Wii so some instructions were given. I

noticed a few traits and behaviour that differentiate Fred as an introvert gamer compared to the other gamers who are extroverts. He was really quiet throughout the game as he was mainly concentrating on the game. His expression of emotion was minimal and conversation with me was more on asking instructions. Also, he was very serious, analysing and thinking on how to play the game and what strategy to be used to win the game. He mumbled to himself a lot and made an occasional sigh and curse during the sessions when mistakes were made. He commented that he was still not used to the Wii despite the fact that the controller is comfortable.

The next session was playing the Mario Kart DS. Fred seemed more comfortable playing on the DS and he was more focused on the gameplay. He seemed satisfied that he can concentrate better on the Nintendo DS and he was in his own world. He said, “It is also easier to win when playing on the Nintendo DS because you tend to focus on the screen and not get distracted by other elements”. Again, his expression was serious and constant during the session.

Single Player Sessions Playing the Education Game (Big Brain Academy Wii and Big Brain Academy DS)

When Fred began the Big Brain Academy game session, he calmly answered the questions in the game. He sat forward on the edge of the seat and it is obvious that he was fully concentrating on answering the questions. He was seen very serious and quiet. His facial expression seemed to indicate deep thought. He had no changes in expression and there were no comments or sound throughout the sessions. At the end of the session, he laughed that he scored a C.

Not satisfied, he tried another session of the game. He sat in the same position and had the same reaction to the game. Fred appeared to be thinking and made no reaction to mistakes that he made during the game. Sometimes, I saw him mumbling to himself while calculating. He showed no reaction to the other gamers, who were watching him play the game. He did shake his head once when he made one wrong answer. He was concentrating on the game and laughed when he scored a C the second time.

5.4.2.2 Multiplayer Sessions with Fred (Introvert Gamer), and John, Alan, and Brian (Extrovert Gamers)

Multi Player Sessions Playing Mario Kart Wii and Mario Kart DS and Big Brain Academy Wii

The differences between extrovert and introvert gamers became evident during multiplayer sessions on the big screen between Fred, Brian and Alan. At the beginning of the Nintendo DS playing session, Alan and Brian were laughing, goading each other and talking. Fred on the other hand was quietly concentrating on the game. Throughout the game session, I could hear Fred making only small comments that were more like asking, *"Where are the other racers positioned?"* All gamers were seen relaxed when playing the Nintendo DS.

During the game session on big screen, Fred was quiet while Brian and Alan were noisy, shouting and goading each other. Fred was competitive during the game and was concentrating on his game rather than interacting with the other gamers. Sometimes Fred smiled or laughed with jokes that were made by the other gamers but he was not as expressive as the other gamers during the game session.

I observed that the introvert gamer felt more comfortable when playing games on the small screen. This is because Fred appeared to be more confident with the gameplay and reacted more to the game.

When playing Big Brain Academy Wii (Multiplayer between Fred and John), the difference can be seen between John and Fred where John said "*Dang*" when he made a mistake and Fred only seemed annoyed (facial expression) when he made a mistake. However, it has to be noted that both gamers concentrated on the screen and they seemed calm and had no reaction on who lost or won the game.

5.4.2.3 My Reflection on Introvert Gamers and Screen Sizes

Throughout my observation, I came across gamers who can be categorised as introvert gamers. They were more reserved and quiet during game session and enjoyed their own space. Moreover, they preferred to think of their gaming strategy. Based on my observation and conversation with these gamers, it can be concluded that introvert gamers prefer small-screen devices or at least a personal screen when they are playing a particular game. They prefer playing games that allow them to learn the story and unflawed achievement rather than socialise.

The following is the list of reasons why introverts prefer smaller screen size.

1) Introverts prefer their own personal space when playing game, therefore, a portable console (small screen) is more suitable for this type of player because it provide the players they own personal screen.

2) Introverts may feel uncomfortable when people look at them while they are playing the game.

> *"I would prefer my own personal screen and playing the game without an audience. In this scenario, only playing the Nintendo DS provided that."* [Fred]

3) When playing educational games, small screen is better for introverts because it allows more concentration, focus and no distraction.

> *"If I was to learn using an education game, I would prefer to do it on a smaller screen, having privacy and learning on my own personal screen."* [Fred]

> *"In my opinion, it would be better playing education on the smaller screen being that it has the advantage of small screen like being able to concentrate more and the touch screen. However, in a large crowd and for an overall learning experience a big screen might be better especially for kids."* [Carl]

5.5 Enjoyment in Gaming and Its Relation to Screen Size

One of the well-known theories that is related to enjoyment in playing games is the flow theory. The flow theory highlights that when playing games there must be a balance between challenge and ability. As discussed in chapter two, the GameFlow model listed the criteria needed to enjoy a game. Most of the elements in the flow theory are similar to the findings of the present study and are discussed in the next chapter.

The data revealed that enjoyment is a key factor in gaming. For both introvert and extrovert gamers, it is of utmost importance to have fun and enjoy the game in order to sustain gaming. Online blogs and articles suggested that playing video, console, online, or computer games are an introvert activity. However, experts have debated this belief by stating that extroverts are also avid gamers (Chen, Tu, & Wang, 2008). The gaming

environment allows gamers to be alone in their own space. It is worth highlighting that the introverts enjoy the gaming world, however; they prefer games where they can create their own world or character suits such as massive multiplayer online role-playing game (MMPORG), strategy games and so on (Chen, Tu, & Wang, 2008).

For this present study, the selected games could be played by both introvert and extrovert gamers. I found that the expression of enjoyment could sometimes differ from these two types of gamers. There were also a few elements that encouraged gamers' enjoyment in playing the game which can be discussed in terms of the type of gamer as well as screen size. These elements include 1) concentration and focus, 2) challenges, 3) immersion, 4) control, and 4) social engagement

5.5.1 Concentration and Focus in Gaming

The differences between concentration and focus among the introvert and extrovert gamers did not really emerge. Both types of gamers have the same level of concentration and focus when playing games. The data indicated that "focus" tends to be more predominant on small screen device and has been observed to be present in both extrovert and introvert gamers.

Concentration has been discussed in the literature as being an important factor to reach the optimum gaming experience (Csikszentmihalyi, 1975; Sweetser & Wyeth, 2005). Nevertheless, the importance of focus in playing games is unclear. It is assumed that concentration and focus are the same or strongly connected to each other (Qin, Rau, & Salvendy, 2009; Sweetser & Wyeth, 2005). This study found that in relation to screen size, gamers can concentrate on a game without being fully focused on it in some cases.

As mentioned in The Free Dictionary online, “An individual can concentrate on an object or act without being focused on reality, such as when he is engaged in a training routine that he knows to be irrational and unproductive, but is doing it very well” (The Free Dictionary, 2013).

Three major results have emerged from the data of the present study regarding concentration and focus. First, concentration and focus seem to be more prevalent when playing games on small screen and it does not only reflect the fact that the screen is small so we cannot see it as well. Second, the word “focus” mostly arises when games are played on small screen. Third, majority of the gamers indicated that puzzle and educational games are more suitable on small screen because they have to stay focused on the screen.

This is supported by strong evidence where comments and observation notes on concentration and focus were emphasised when the games are played on small screen.

> *“Playing the puzzle game on the DS you tend to be more focused, I feel that education game is better on the DS because you tend to be more focused. It is also more personalised.”* [Mike]
>
> *“I feel that playing education and puzzle game on the DS is more suitable because you can give your full attention and focus on it. It is easier to get distracted on the big screen.”* [Peter]

The detailed findings on focus and concentration are divided into two sections: section 5.5.1.1 discusses focus and section 5.5.1.2 discusses concentration. The discussion emphasises on how focus and concentration impact the gamers when playing on different screen sizes in relation to the game genre in this study.

5.5.1.1 Focus in Gaming

Focus can be defined as "a point upon which attention, activity, etc., is directed or concentrated" (Collins English Dictionary: The Authority of Current English, 1994, p. 597). From my observation, I transcribed the gamers' action of staring at the screen, looking only at one place for a long time and squinting their eyes as focus. This is supported by comments made by the gamers during gaming sessions, interview, and stimulated recall interview.

The gamers demonstrated that focus is prominent when playing games on small screen compared to the big screen. This is mostly emphasised when playing educational puzzle games. The data of the present study disclosed that there are three main reasons that influence the gamers to be more focus on small screen. These reasons are a) the game design, b) distraction and personal space, c) the controllers.

A. The Game Design

Games that are created on different consoles have several different features. These features include the screen size, the controller, the hardware and software of the device. Even though the game mechanics are the same, the game layout, graphics, and features are different according to the consoles.

The game design of the action kart racing game (Mario Kart) is different in Mario Kart DS and Mario Kart Wii. The main difference is with the graphics in Mario Kart Wii, which is 3Dimensional and high definition. On the other hand, the design on DS is simpler and less cluttered. The design of the game and other factors, such as the controller design, +has made it easier for the gamers to focus when playing on smaller screen.

> *"The small screen makes it easier to focus thus making me get 1st place much easier. In conclusion, I like playing Mario Kart on the small screen."* [Dean]

> *"I prefer playing on the DS since it is clearer."* [Luke]

As regards the educational game (Big Brain Academy) design, the small screen format of the game has made the game more challenging. This is due to the various difficulty levels of questions in the small screen game design and there was also a timer on the small screen game design. The participants commented that a higher level of focus was needed to answer the questions.

> *"I can concentrate and focus more on the DS since there are not that many images to see making it easier to play the game. The timer on the game also makes it more challenging and requires higher focus."* [Peter]

B. Distraction and Personal Space

Getting distracted during the gaming session affects gamers' performance because they lose their focus in the game. It was observed that when being distracted, gamers were frustrated when they make silly mistakes that affect their performance. A few gamers stated that they get distracted by the wonderful graphics, scenery and features in the big screen game design. On the small screen, the game is less distracting and this helps gamers to focus on winning the game. Another reason for distraction is that gamers have the tendency to feel distracted by people who watched them playing the game on big screen. Other gamers would cheer, provoke, shout and put pressure on the gamer during the gaming session, which can be distracting. Apart from that, gamers tend to lose focus during multiplayer mode on the big screen. The screen will either be divided into two or four in multiplayer mode on the big screen. Hence, a gamer can lose focus by getting distracted or confused with the other gamers' section of the screen.

> *"When playing on the big screen you get distracted by the view and on what is in front of you."* [Brian]

> *"When looking on a big screen its distracting because you have to scan throughout the screen and unfocused. Whereas on the small screen it is more 'there' and focused."* [George]
>
> *"When playing the game multiplayer on the big screen is rather challenging because of the split screen so you are distracted by your opponents' screen."* [Fred]

The main contribution of the small-screen device (Nintendo DS) is that it allows gamers to play on their own personal screen without any interruption from others. Even when playing on multiplayer mode, gamers would be able to focus directly on their own screen without being distracted by other gamers in the same race. Thus, the participants of this study revealed that it is easier to focus when playing on small screen.

> *"The DS is more fun because I can control the game really well and other people can't see what we are playing so I don't get stress because I only play on my own."* [Peter]

In the educational game (Big Brain Academy), some gamers like to focus on the game quietly on their own without any interruptions.

> *"Playing the puzzle game on the DS you tend to be more focus, I feel that education game is better on the DS because you tend to be more focus. It is also more personalise."* [Mike]
>
> *"On the DS it is better to play this kind of game (Education and puzzle game) because you are so focus and not easily distracted by others."* [Peter]

C. The Controllers

The comfort and expertise in using the controller plays a vital role in gamers' concentration and focus. All the gamers expressed the impact of the controller on their performance when playing a game. In this study, the results showed that in terms of 'focus', majority of the gamers prefer using the Nintendo DS when playing the two games. The navigation pad controller on Nintendo DS is easier to use compared to the

Wiimote. The simplicity of the controllers on the DS made it easier for gamers to play and focus on the game instead of learning to get use to a certain controller.

> *"Even though playing on the DS the screen is small but we focus on the screen and the controller is much easier to use."* [Luke]
>
> *"When playing on the small screen I focus more. The controller on the DS is also more convenient and user friendly."* [Dean]

For the educational game, a few gamers mentioned that the use of stylus and touch screen has made it easier for them to focus and answer the questions. This is mainly because it is similar to using a pen and paper to solve problems.

> *"You have easier control because you are using the stylus to answer the questions."* [Peter]
>
> *"Educational game is far more bearable on the DS and it's also better to be more tactile like using the stylus because we are used to pen and paper."* [George]

5.5.1.2 Concentration in Gaming

Concentrating can be defined as, "to come or cause to come to a single purpose or aim" and concentration is defined as, "intense mental application; complete attention" (Collins English Dictionary: The Authority of Current English, 1994, p. 333). Concentration is also "the act of isolating one's attention on a specific object, task, or aspect of consciousness. Anyone who has done any type of meaningful work in his or her life has had some experience with concentration. An individual does not have to be in focus to concentrate, and vice versa" (The Free Dictionary, 2013).

From my observation, I transcribed the actions of staring at the screen without being distracted by external comments, a serious or constant expression on the face, not many

changes in movement throughout a game stage and sitting in front of the sofa and up right as concentration. This is supported by comments made by the gamers during gaming sessions, interview and stimulated recall interview.

During my observation and interview session, I noticed that concentration is important to enjoy the gaming sessions. All the gamers concentrated really hard on the gameplay and tried to win. However, after a few sessions with the participants, I observed a significant difference between the level of concentration when playing games on big screen and on small screen, as well as between playing single player and multiplayer gaming. In this study, there are a few aspects that disrupt the gamers' concentration during gaming sessions, which consequently has made the gamers to point out the benefits of playing games on small screen device.

A. Split screen features when playing multiplayer game

The gamers found that playing on big screen during the multiplayer mode (split screen either into two or four) is confusing and distracting. This sometimes affected their concentration. A gamer may become confused and accidently look at another screen while racing and will then lose the game

> *"In terms on multiplayer the split screen is disturbing to the concentration, on the DS we only concentrate on our track and not distracted by other things."* [Peter]
>
> *"When playing the game multiplayer on the big screen is rather challenging because of the split screen so you are distracted by your opponents' screen."* [Fred]

Some gamers felt the pressure and lose their concentration when they see the other gamers' position while playing the game. A few gamers commented that when they were

playing the educational game on multiplayer mode, they felt tense and lost their concentration especially when they saw their opponent was ahead of them.

The gamers pointed out again that playing on the Nintendo DS helps them to concentrate because they have their own screen to play on and would not be confused or affected by their opponents' screen.

> [Alan] concluded that using the DS is more fun because they play together but they do not bug each other because they have their own personal screen.

B. Distraction

Distraction is another issue for the gamers in the gaming sessions. It is hard to have a full concentration when a gamer is distracted with the people or graphics. In relation to the game itself, a few gamers stated that the wonderful graphics, scenery and features in the big screen game design distracted them. However, the games created for small screen were less distracting and helped the gamers to concentrate on winning the game

> *"You can concentrate when playing Nintendo DS because of the small screen. When playing Mario Kart on Nintendo DS, you concentrated on the race only and you say to yourself… I can win… I can win. (motivation). No distraction. You play to aim to win. When playing on the big screen you get distracted by the view and also on what is in front of you."* [Fred]

C. The controllers

The controller plays a major role in the gamers' concentration during the gaming sessions. Most of the gamers found that it was more difficult to concentrate when playing the games using the Wiimote. The Wiimote was challenging to control and tiring. On the Nintendo DS, the controllers were more comfortable and making it easier for the gamers to win and concentrate on the gameplay. As for the educational game, using the stylus and touch

screen had a big impact on the gamers' concentration, as it was more comfortable and familiar.

> *"You also have easier control because you are using the stylus to answer the questions."* [Peter]
>
> *"The DS is much preferable mainly because its touch screen and using a stylus."* [Carl]

5.5.1.3 Conclusion on Focus and Gaming

It is evidenced in this study that the importance of concentration and focus is present in both screen sizes. However, the results showed that there are differences between concentration and focus when playing on big screen compared to small screen. The participants commented that playing on small screen allows them to focus and concentrate. Moreover, some of the participants felt that small-screen devices are more personalised. It is worth noting that the level of focus is higher on small screen sizes especially when playing educational games. The design of the game on small screen is an advantage in terms of indirectly encouraging gamers to focus more on the screen and concentrate on the questions.

> *"I do prefer playing on the big screen however on the small screen I concentrate more and also feel relax. I can concentrate on the education game and puzzle."* [Harold]

Notably, this does not indicate that concentration and focus are non-existent when playing a game on big screen. Gamers need to concentrate if he or she wants to finish or win a game on big screen. When playing on multiplayer mode, gamers have to concentrate more because they can easily get confused or distracted by other gamers. The gamers need to give their full concentration and focus on their gameplay and their section of the screen to win the game. When playing multiplayer educational games, one gamer stated:

> *"You need full concentration. Cannot talk at all when playing the game. If you do you lose your concentration. Throughout the whole session when playing the game."* [Brian]

In terms of evidence, concentration and focus on the big screen data were derived more from observation than the gamers' comments. Quotes from interviews and comments from gamers were more established when playing on smaller screen size in terms of focus and concentration. Therefore, I concluded that when playing on small screen, concentration and focus seem to be more dominant and this indirectly increased the performance to win a game.

5.5.2 Challenge

The second element in enjoyment is challenge. The data indicated that the gamers enjoyed a game the most when ample challenge is present during the gaming session. Both introvert and extrovert gamers enjoyed the game when there is adequate challenge to the game. Notably, the challenge should be appropriate to the ability of the gamers.

5.5.2.1 Playing Mario Kart Wii and Mario Kart DS

> [Mario kart Wii] On the next race, this track has snow on it so it's a bit slippery. All three are laughing and goading each other. I conclude that some players are quieter than others even in multiplayer games. The same as the previous race, gamers are commenting on strategies to make each other lose the game except for Fred who seems to be a quiet gamer. Alan shows much satisfaction when winning the race whereas John shows dissatisfaction. The competition and determination to win is shown throughout the game session. [My Observation Notes] Alan, Brian, John (extroverts) Fred (introvert)

An extrovert gamer enjoyed being challenged by friends compared to playing alone. When playing alone, the extrovert gamers cursed, laughed at the mistakes made, hummed

to the music and concentrated on the game. However, when playing in a group, the extrovert gamers seemed more enjoyable as they were able to hackle, shout, joke and laugh with friends.

> *"I feel a bit confused and distracted when playing the big screen cause of the split screen. However, it is exciting since you playing with a lot of people (friends). It's also quite challenging. The more you play, the more you want to play again and again."* [Luke] extrovert gamer

Introvert gamers also enjoyed being challenged by the game and showed their emotion slightly during the sessions when playing alone. They concentrated on the games and tried their best to win the games. During multiplayer sessions, the introverts were mostly quiet, made comments, smiled at jokes other friends cracked and not really responding to mental games that the other gamers were involved in. An introvert is "not shy however sometimes find other people trying" [caring for your introvert]. They enjoy company but they choose the company they want to be with.

> *"It is also much fun playing with a friend because I have competition and could feel the satisfaction in the competition."* [Carl] introvert gamer

5.5.2.2 Playing Big Brain Academy Wii and Big Brain Academy DS

Big Brain Academy Wii was not really a challenging education/ puzzle game. The questions were easy and only sometimes slightly confusing. Most of the gamers knew how to play the game really fast, however none of the gamers were able to score above a B average for their grade. While playing the game, the introvert and extrovert did not really show they were enjoying themselves, however they did concentrate really hard on trying to answer all questions correctly. When playing multiplayer though, the game became more interesting to the gamers, having a race to answer the question gave the

gamer some thrill and anxiety which caused some of the gamer enjoys this section of the game.

Big Brain Academy on the Nintendo DS seemed preferable to some of the gamers. One of the reasons is that the game design was a bit different. The questions were more challenging and answers were timed.

> *"The Big Brain Academy is annoying; however, playing the education game on the DS is more engaging and more challenging."* [George] introvert gamer
>
> *"When playing the education game on the DS, I felt I want to try again and again so that I'll improve my performance. I feel challenged and motivated. The game also has a time limit that makes the game more challenging."* [Peter] introvert gamer

5.5.3 Immersion

The third element of enjoyment is immersion. Both introvert and extrovert gamers seemed to experience a deep involvement in Mario Kart Wii and Mario Kart DS. The gamers became less aware of their surroundings and lost sense of time. Both types of gamers seemed to be engrossed in this game. Furthermore, they feel immersed in the game and enjoyed the game.

> Start of second race, both gamers seriously playing the game. Alan making mixed weird facial laugh when accidently bomb himself, Brian showed satisfaction and happiness when he is in first place. Brian following the sound effects of the character in the game being immersed in the game. Alan showing his frustration on his placement in the race which is 10th place. [My Observation Transcription] Alan and Brian (extrovert gamers)
>
> *"I do prefer racing games especially this game because it is fun family game. Mario Kart is really fun, I feel like I was driving and immersed in the game."* [Harold] introvert gamers

The gamers showed various emotions throughout the gaming sessions. Emotions varied from excitement, happiness, frustration, annoyance, confusion and satisfaction to stress. The gamers exhibited their happiness and excitement by laughing. Frustrations were sometimes due to mistakes made or by losing the game. Confusion and stress were evidenced by the lack of expertise in using the Wiimote controllers or by the split screen on the large screen. Satisfaction was usually demonstrated when the gamers won the game.

5.5.4 Control

The fourth element of enjoyment is control. Gamers must be able to control their action to enjoy the game. The ability to control over the characters and interact with the game is of utmost importance to the gamers. Apart from that, gamers must be able to have a sense of control over the controllers. This important factor emerged significantly in this study. As discussed in sections 5.5.1.1 (point C) and 5.5.1.2 (point C), the ability and comfort in using a controller affect the gamers' concentration and focus in the game.

5.5.4.1 Playing the Mario Kart Wii and Mario Kart DS

The use of the Nintendo WiiMote seems to affect the gamers considerably during gaming sessions. Most of the gamers felt frustrated using the Wiimote due to its sensitivity. Comments were made by the majority of the gamers who were more comfortable using the navigation pad on the DS.

> He found it difficult understanding the controller especially its sensitivity. He prefers traditional joy pads or arrow keys. However, throughout the game he got better with the handling of the Wiimote. (Observation Notes and comments) [Brian]

> *"I find it easier playing the Mario Kart DS then on the big screen because of the controller. The controller really plays an effect on game play."* [Peter]

5.5.4.2 Playing Big Brain Academy Wii and DS

When playing the Big Brain Academy game, most of the gamers indicated that the stylus and touch screen are more appropriate for this game because it is like writing on pen and paper, which is a normality of learning. They further explained that the Wiimote was distracting and too sensitive.

> *"In terms of controller, the DS is much preferable mainly because its touch screen and using a stylus."* [Carl]
>
> *"The educational game on the DS is more engaging maybe because the Wiimote is distracting."* [George]

5.5.5 Social Engagement

> The gamers were really competitive and having audience (friends) does give effect by making the atmosphere more jovial. I could feel the excitement in the room. The audience made noise by cheering loudly. They seemed to switch their cheers to only the gamer who was losing the race. The noise did not disrupt the gaming sessions of the gamers.
> [Observation Notes] Rick, Mike, Steve, Nelson

The fifth element reflected from the data of the present study is social engagement between the gamers. As discussed previously, the level of social engagement depends on the type of gamers. It was clearly observed that extrovert gamers enjoyed company, competing with other gamers and felt extra energised in social gaming environment. Extrovert gamers were engaged and joined the fun even though they were just audience and do not playing the game. Extrovert gamers preferred playing multiplayer sessions for both Mario Kart Wii and DS game and the Big Brain Academy games.

With regard to the introvert gamers, social engagement was only beneficial if they are playing with a group of people they are comfortable with. I gather that introverts prefer playing social games that are more private in nature such as online gaming. It was pointed out by a few introvert gamers that having people watching them playing is stressful. Introvert gamers prefer having their own personal space when playing a game. Hence, social engagement is more beneficial for the extrovert gamers to play games on big screen whereas it the introverts prefer to play games on smaller screen that minimised social engagement.

5.5.6 Conclusion on Enjoyment and its Relation to Screen Sizes

There were mixed reviews on the enjoyment factors in playing games on big or small screen. Introverts and extroverts gamers have their own criteria with regard to their preferences on big or small screen size.

a) When Big Screen Is Preferred

The gamers found that Mario Kart is an enjoyable and fun game to play. They commented that playing this game on the Nintendo Wii (big screen) is more fun than the DS. This is due to the fact that the graphics on Nintendo Wii is better, objects are clearer, the environment is more realistic and the game is visually exciting. Some gamers felt that playing on a big screen allows them to be more expressive and emotionally satisfying.

> *"I prefer big screen cause is more fun and more to see."* [Brian] Extrovert
>
> *"Emotionally big screen is more fun and satisfying. There is more expression that you can convey rather than playing on a small screen. Emotion like excitement, anger, frustration."* [Dean] Extrovert
>
> *"I feel that the big screen is much easier to play and fun because you can see more of the game. You have a lot of room on the eyes. [Harold] Introvert*

> *I feel that the bigger the screen is better. It makes the game more immersive."* [Isaac] Introvert

A few gamers pointed out that playing on the big screen is more fun provided that they are comfortable with the controller.

> *"I prefer playing on the small screen device because the controller is simple. When it is simple it makes the game easier to play. But playing on the big screen is more fun."* [Carl] introvert gamer

> *"I would be more motivated to play more frequently on a big screen because I think it would be more fun provided I am already used to the controllers."* [Peter] Introvert gamer

Having bigger screen during multiplayer sessions can be an advantage because it adds more pressure to the game. Seeing other gamers' screen adds challenge to the game but it is also a disadvantage because it can confuse the gamers.

As regards playing the Big Brain Academy (educational game) on the big screen, it was hard to tell if the gamers were enjoying themselves. This is because the gamers were quiet and more serious and a few gamers found it rather boring. Enjoyment in playing this game can only be seen by a few gamers who tried the multiplayer session. They felt that the multiplayer sessions were more challenging.

b) When Small Screen Is Preferred

Mario Kart on the DS was also enjoyable. The gamers pointed out that the navigation pad has made the gameplay simple and this influences the enjoyment of the gaming sessions. Some gamers preferred their own screen to concentrate on while playing. On the other hand, a few gamers preferred the design of the game, which is the navigational map that is clearer in the screen.

> After playing one session of Mario Kart DS, they felt more immersed in the game because of the controller. The fun and excitement of playing the game on the smaller screen seemed more personal. They showed greater competitive reaction as well as making much more noise than playing on a bigger screen. [Observation Notes] Brian and Alan (extrovert gamers)

> *"I find playing multiplayer on the small screen more fun and my performance is better on the small screen."* [Luke] Introvert Gamer

> *"After playing the Wii and the DS, I found that playing multiplayer on the Wii is more fun, playing the Mario Kart Wii, even though the screen is big, it is very confusing. The DS even though it is small, the player has individual screen that he can focus his attention too. The controller is better too. The DS is more fun than the Wii in terms of multiplayer."* [Carl] Introvert Gamer

c) **Introvert Gamer**

When playing educational games, the gamers emphasised that learning (in certain circumstances) might be more suitable on small-screen devices. Personally, I believe that it depends on what kind of person you are. As discussed earlier, playing on big screen among friends or in a group suits an extrovert person while being in their own quiet learning environment is more suitable for introvert gamers.

> *"Playing education game on the small screen is better being it has the advantages of a small screen however, in a large crown and for an overall learning experience, big screen might be better especially for kids."* [Carl] introvert gamer

> *"In my opinion if the game is for fun… its better played on a large screen, however if you want to learn and focus its better on smaller screen."* [Peter] introvert gamer

The data also indicated that on smaller screen size, gamers can focus and concentrate on the game which could be a plus point in educational games.

5.6 Chapter Summary

This chapter discussed the ethnographic results of this study. It began by discussing the success of using SGE as the "field" for the present study, which is evidenced when the gamers felt comfortable in this environment and spent hours playing games during the observation. Moreover, the gamers requested that the ambient lighting, and sitting positions be made comfortable.

Scenarios, observation and quotations were included to narrate the results that inductively emerged from the data. Two themes that affect the gamers' intrinsic motivation when playing games on two different screen sizes were identified. These two themes are type of gamers (extrovert and introvert) and enjoyment elements. The extrovert gamers prefer playing on the big screen because it provides them opportunity for social interaction, whereas the introverts prefer small screen because it provides them personal space. The second theme is enjoyment, which includes focus and concentration in gaming, challenge, immersion, control and social engagement. It is noteworthy that these elements of enjoyment indirectly reflect the intrinsic motivation for gaming. Other factors such as game design, distractions and usability of controllers were also explained. Consequently, it can be concluded that some elements are preferable for the big screen and small screen. Additionally, it is important to refer to both type of gamers and the enjoyment elements of gaming to determine the intrinsic motivation of the gamers when playing games. The following chapter will continue with a discussion on the themes derived from the results of this study.

6. DISCUSSION

6.1 Introduction

The present study employed a qualitative and interpretive research, which focuses on an ethnographic research method as discussed in chapters 4 and 5. The analysis of the data was inductive and therefore, the results emerged directly from the data. The literature review and research question focus on how screen size affect gamers' intrinsic motivation when playing video games. As stated in chapter 5 the path of the results has changed. This is due to the fact that in an interpretive ethnographic research, the focus of the research might change or a new surprising revelation might emerge based on the data collected.

In this study, it is worthy of note that the focus on the impact of two different screen sizes (40 inch and 3.4 inch) on gamers when playing a particular type of game genre has not changed. The emphasis on intrinsic motivation, however, did not directly emerge from the data. Nevertheless, I will relate intrinsic motivation with the results in the conclusion part of this study. The result indicated two major themes. The first theme was on the preference of screen sizes in accordance with extrovert and introvert gamers. The second theme was on factors of enjoyment when playing different screen sizes with these game genres. The enjoyment theme was divided into five sub themes: focus and concentration, challenge, immersion, control, and social engagement. As presented in chapter 5 the two major themes and sub themes are sometimes interrelated.

I would begin the discussion with a review on introverts and extroverts and its relation to this study. Moving on, I continue discussing on how this could be interpreted in education

and learning in classrooms. This is followed by the discussion on the enjoyment of gaming.

6.2 Understanding Extroverts and Introverts

At the beginning of this study, personality type was not considered as part of the research. However, upon doing the analysis, the data inductively exhibited two distinct personality types of the gamers. Therefore, this section of the chapter reviews and discusses the literature that would help explain more on the two personality types that emerged from the data gathered, which were Extroverts and Introverts.

It is of utmost importance to understand the personality of a person in understanding individual's preference, motivation and behaviour. Limperos, Schmierbach, Kegerise, & Dardis (2011) defined personality as a "dynamic and organised set of characters possessed by a person that uniquely influence his or her cognitions, motivations and behaviours in various situations" (p 4). One of the popular models of personality traits is known as the Big-Five personality traits that include extraversion, neuroticism, agreeableness, conscientiousness and openness (McEwan, Johnson, Wyeth, & Blackler, 2012).

According to Barrick and Mount (1991), in the Big-Five personality traits, the first factor is extraversion or surgency, which is associated with traits such as being sociable, gregarious, assertive, talkative and active. The second factor is neuroticism, or emotional stability that refers to being insecure, anxious, depressed, angry, worried and embarrassed. Next, is agreeableness or likability, which includes being trusted, courteous, flexible, tolerance, forgiving, cooperative and soft-hearted. The fourth factor refers to

being dependable and responsible, careful, thoughtful, hardworking and having perseverance, and is known as conscientiousness or dependability. The last factor is openness to new experiences or intellect, which refers to being creative, imaginative, open minded, intelligent and a broad minded individual.

Among the five personality traits, this study focuses on the extraversion and its contrast, introversion. This is due the fact that these two personality traits were identified in the data analysis. As discussed in chapter 5, it was revealed that gamers with these two different types of personalities tend to have different preferences in gaming styles and gaming environment, which indirectly influence their preference on screen size.

6.2.1 The Extroverts (Social Interaction with Big Screen Preference)

The term introversion and extraversion were first introduced by Carl Jung in relation to his theory. The extroverts felt more empowered when interacting or surrounded by a large group of people, and they would feel less energised when they were left alone (Limperos, Schmierbach, Kegerise, & Dardis, 2011). Table 6.1 describes Jung's traits for extroverts. This table lists the psychological types of an extrovert, which includes being sociable, fearless, confident, outgoing, optimistic and greatly influenced by the environment surrounding them listed.

Table 6.1 Jung's psychological types

Jung (Jung's Psychological Types, 2009)
▪ Motivated by outside factors and greatly influence by the environment ▪ Sociable and confident in unfamiliar surroundings, less cautious, less fearful ▪ Like organisations, parties, and tends to be optimistic and enthusiastic

The Big Five Personality Model specified that extraversion personality traits include being talkative, lively and outgoing (Fang & Zhu, 2011). Referring to Table 6.2, which defines the facets of the Big Five Traits domains in line with the three different approaches, these attributes were employed to identify extrovert personality types among the participants (Sin, Talib, Norishah, Ishak, & Baki, 2014).

Table 6.2 Defining facets for the Big Five Trait domains: Three approaches on extraversion

Lexical facets (18) (Saucier & Osterndorf 1999)	**NEO-PI-R facets (30) (Costa & McCrae, 1992)**	**CPI-Big Five facets (16) Soto & John, 2008)**
▪ Extraversion (E) facets ▪ Sociability ▪ Assertiveness ▪ Activity/Adventurousness ▪ Unrestraint	▪ Gregariousness ▪ Assertiveness ▪ Activity ▪ Excitement-Seeking ▪ Positive emotions ▪ Warmth	▪ Gregariousness ▪ Assertiveness/Leadership ▪ Social Confidence Vs Anxiety

Adapted from Handbook of personality: Theory and Research. (Sin et al., 2014) (p 126)

As extrovert gamers enjoy games that allow for more social experience, the role of screen size may impact the experience of the extrovert gamers as discussed in chapter 5 (section 5.4.1). It is safe to conclude that the big screen allows more social interaction to the gamers even when they are playing in single player (provided there is an audience) or multiplayer. The preference to play an action racing game (Mario Kart) by extrovert gamers was observed to be more prominent on big screen.

It is noteworthy that several studies in the literature supported the conclusion that I made by identifying the characteristics of extrovert gamers in video gaming (Fang & Zhu, 2011; Furió, González-Gancedo, Juan, Seguí, & Costa, 2013; Wyeth, Sweetser, and Gardner, 2012; Yee, 1999). Fang & Zhu (2011) carried out an online survey to investigate the relationship between enjoyment of computer gameplay and personality traits. 1096 gamers from four universities in US, Korea and China responded to the survey. Based on

the survey, they concluded that computer game players with extraversion personality traits preferred a game that requires extensive social interaction. Another research carried out with the objective to understand how personality is expressed in the virtual worlds. 1040 World of Warcraft players were asked to complete a web-based survey. It was found that individuals who scored high in terms of extraversion preferred group activities and hence, preferred social engagement (Furió, González-Gancedo, Juan, Seguí, & Costa, 2013). Yee (1999) explored the interplay between player and character selves in role-playing games by means of 100 questionnaire responses. He found that extrovert gamers are "energised by social interactions. They are active and feel at home in crowds or busy places" (p. 11). Johnson, Wyeth, Sweetser, and Gardner (2012) also stated that gamers with extraversion personality traits showed that they prefer games in the dancing games genre, which is also concurred by Teng (2008) who stated:

> High-extraversion individuals generally engage in interpersonal interaction and enjoy such activity (dancing genre). They have a strong motivation to learn and learn things actively and energetically, facilitating their mastery of new skills and the upgrading of their capabilities. They are also energetic and ambitious, allowing them to accomplish tough tasks (p. 233).

In terms of educational games, I referred to the Myers and Briggs' indicator (Brownfield, 1993) (see Table 6.3) on extrovert learners. The extroverts prefer a more social interaction and action-oriented learning environment. As regards this study, the extrovert gamers showed preference for playing the educational game on big screen due to the interactivity of the graphics, having the audience and competing with another player seemed to motivate the gamers more. Nevertheless, it is worth noting that the main factor for game preference in terms of educational game among the extrovert gamers is more to the challenges in the gameplay (this is discussed in detail in section 6.2.3). The extrovert gamers like learning to be activity based, as they are sociable in groups (Fu, Su, & Yu, 2009).

Table 6.3 Myers and Briggs indicator for extrovert in learners

Myers and Briggs Indicator for Extrovert in Learners (Brownfield, 1993)
▪ Focus on outer world of people and things. ▪ Think and learn best when talking, like cooperative learning groups, and they rely more on trial and error than on forethought when solving problems. ▪ Get bored with long slow jobs and do not do as well when forced to keep everyone else pace. ▪ Like action and variety (classroom full of group discussion, hands-on activity and active breaks from the solitary tasks of reading and writing).

Offir, Bezalel, and Barth (2007) carried out another study on introverts, extroverts, and achievement in distance learning environments. They discussed the significance of adapting lessons and the needs of students in accordance with their personality profile. They found that extroverts prefer having people around them and learning in an environment that allows spontaneous interaction.

6.2.2 The Introverts (Personal Space with Small Screen Preference)

In contrast to the extroverts, the introverts feel more empowered when left alone but less energised when surrounded by a large group of people (Limperos et al., 2011). Table 6.4 demonstrates C.G. Jung's traits for introverts, which include happy in their own thought and prefer to reflect, imaginative, sensitive, and seclude themselves from society.

Table 6.4 Jung's psychological types

Jung (Jung's Psychological Types, 2009)
▪ Happy alone with a rich imagination, Prefers reflection to activity ▪ Not interested in facts per se but are interested in abstract ideas. Facts are not collected for their won value. Give little attention to their relationship with the world ▪ Sensitive and imaginative

Social media and blogs have popularised gamers to be introverts such as the Big Bang theory sitcom. Bateman and Boon (2005) in their book, *21st Century Game Design* stated that majority of the gamers are introvert as they can spend a long time on their own to

complete a task (such as playing single player games). However, it was revealed that extroverts would play games when they are bored and introverts would play games because they want to. Another research conducted by IGN Entertainment and Ipsos Media CT found that gamers can no longer be stereotyped as solitary introverts. The results of their quantitative and qualitative study showed that gamers are more outgoing and more active people (MarketingCharts staff, 2008). I found that the gamers who participated in my study were either introvert or extrovert gamers who enjoy playing games regularly.

Moreover, few studies have emphasised on the preference of games or game environment preferred by the introverts (Brownfield, 1993; Fang and Zhu, 2011; Yee, 1999; Yee, Ducheneaut, Nelson, and Likarish, 2011). Hence, it is safe to conclude that if an extrovert like a game, they would prefer strong social engagement and the introvert would prefer the contrary. Fang and Zhu (2011) studied the relationship between enjoyment of computer gameplay and personality traits. Gamers who scored low in extraversion would choose to play a game that does not require or requires minimal social interaction. This is repeated in Yee, Ducheneaut, Nelson, and Likarish (2011), as they stated that "behavioural indicator in the virtual world, gamers who has a low score in extraversion tend to prefer solo activities such as cooking, fishing, or questing" (p. 759). Brownfield (1993) also indicated that "people who are introvert are motivated by their inner worlds not needing a lot of outside energy to drive their interest" (p. 8). Yee (1999) further explained that introverts are usually reserved and appear shy in social situations.

The overall result of this study supports the theory of the introverts' personality of being in their own comfortable world of individuality. The observation has revealed that when playing a game, introvert gamers prefer their own personal space. Thus, this supports the theory that introvert gamers prefer to have their own personal screen or on a smaller

screen size. Moreover, the multiplayer mode was preferable in a secluded environment and it is evidenced in this study that the introvert gamers were uncomfortable when observed by other gamers.

When playing the educational game, the introvert gamers prefer privacy of playing on their own screen or a smaller screen without any distraction from other gamers. This is because they need full concentration and focus on the games played. Table 6.5 shows the Myers and Briggs' indicator for introvert learners, which discussed the behaviour of introverts when learning in a classroom environment. Introvert learners prefer a quite learning environment and they concentrate on the task they are assigned with. Also, they prefer to work individually and prefer to receive information rather than learning by means of open discussion. The main attribute of personal space and privacy in learning could be an advantage for the introvert learners or gamers if a small screen console is introduced in a classroom environment while playing educational games.

Table 6.5 Myers and Briggs' indicator for introvert learners

Myers and Briggs Indicator for Introvert in Learners (Brownfield, 1993)
▪ More interested in having quiet learning environments where they can think things out and concentrate on the task at hand. ▪ Would rather work alone than in groups because they do not want thought to be interrupted. ▪ More comfortable in the lecture-based teaching format. Schools are usually structured in favour of introvert with student sitting quietly in rows while teachers lecture.

Notably, these finding are concluded in the scope of this study, which involves a simulated gaming environment that is in a more social environment like a friend's house, a cybercafé, or more closely to the motivation of this study, a classroom environment. It is difficult to abstract the findings as for where the introvert gamer is in his/her own space such as in his/her room without any audience.

6.2.3 Introvert and Extrovert Gamers and Educational Gaming in Classrooms

The above section highlighted that many researchers have identified that a person's personality traits play a role in his/her preference for gaming, learning and individual enjoyment. The assumption that most gamers are introvert can be disproved as studies have shown that extroverts gamers are also enthusiastic gamers. The preference for the genre, game environment, or even the avatar chosen may differentiate an introvert and extrovert gamer. Some studies found that games such as guitar hero or dance central that encourage audience are more likely to be enjoyed by extrovert gamers and it would be uncomfortable for introverts as they could get over-stimulated by too many people (Hall, 2003; Reeves, Benford, O'Malley, & Fraser, 2005; Westwood & Griffiths, 2010).

Teng (2009), in his study; *Online Game Player Personality and Real-life Need Fulfillment*, sampled 114 online game adolescent players and found that there is a;

> "positive correlation between extraversion and fulfilment of needs for affiliation and dominance. Such correlation indicates that highly extroverted players can satisfy their needs for affiliation and dominance both in real life and in online games, breaking the stereotype that all game players are introverted and have unsatisfied needs for affiliation" (p. 39).

Ferrai (2007) concluded that extrovert gamers felt more immersed in games that have a large social component while introvert gamers preferred to concentrate on one activity at a time and enjoy the full excitement of the gameplay.

It is deemed that the unique aspects of the personality traits of extrovert and introvert gamers have a big impact on how games are designed and for what purpose. For instance, the use of educational games should definitely cater for the type of personality and cognitive style of gamers. The possibility of using game consoles in a learning

environment such as classroom should account for the type of game, the students' preference according to their personality (extrovert or introvert) and the technology being used. This study was instigated by the literature on the potential of using handheld consoles as a tool in the classroom environment (refer to sections 2.8). Upon reviewing the literature, it was found that there are potential advantages of small screen device or gaming consoles as a learning tool in gaming. However, the effectiveness and the impact of screen size on gamers' motivation are still under researched. Therefore, I began this study by trying to understand the intrinsic motivation of gamers when playing two genre of games (action cart racing game and educational game) using two different screen sizes.

Squire (2005) raised an interesting concern in his journal paper entitled changing the game: *What Happens When Video Games Enter the Classroom?* He concluded that using video games in a classroom would not be an easy task. The main concern is to change the culture of learning in most schools and to cater to a more student oriented approach. However, many studies have proven the beneficial value of bringing educational video games, in particular handheld consoles, into the classroom. In the UK, the PlayStation Portable (PSP) has widely been used in schools, special needs school, city learning centres, hospitals, universities and corporate learning centres in both the public and private sectors. The PSP has been utilised to teach Geography and History, PE and A Level ICT, and other subjects. The HMS Collingwood, a specialist Royal Navy (RN) training centre for recruits in the UK used the PSP to train basic numeracy skills to their recruits (Connected Services Ltd, 2009). In the context of Iran, Shirali-Shaereza (2008) proposed the use of PSP consoles in Iran as a tool to improve English classes in Iranian Schools.

Since Nintendo DS has come out with many educational software titles, it has become as a learning device that is increasingly popular in Japan. The first educational software release was the Brain Age Game, which encourages training of the brain during gamers' free time. Bunce (2010) indicated in his study that "the Nintendo DS has great potential for collaborative and inquiry based learning in schools, increased student motivation and implication for staff training and support" (p 172). In his online article *Beyond Pokémon: Nintendo DS goes to school in Japan*, Kane (2007) explicated that a school in Japan used the DS to teach English vocabulary to junior high school students and "the school found that nearly 80% of students who used the DS each day mastered junior-high-level competence in English vocabulary, compared with just 18% before (p.A1)". Pulman (2007) also stated in his paper titled *Can a Handheld Gaming Device Be Used As An Affective Assistive Technology Tool?* that the mobile device (Nintendo DS) is "personal and has helped to develop familiarity, expertise and confidence for the students using them" (p. 11).

As discussed in the above literature, the use of handheld consoles in classrooms is beneficial. However, those studies did not specifically take into account the personality of each gamer. Whitton (2007) found that not all individuals find computer game-based learning to be motivational but it could be an effective learning method. Hence, the personality traits of the learners can be beneficial in determining the effectiveness of using games in classroom.

Park, Park, & Kim (2011) carried out a study to identify the effect of action levels of educational games on learners' intrinsic motivation through their personality types. The study revealed that extrovert learners have higher intrinsic motivation in game-based learning due to higher level of action when learning using games. They further concluded

that learners' intrinsic motivation can be improved by distinguishing games for extrovert and introvert learners. Another study conducted in an American high school to determine if educational video gameplay to be a motivating experience to students and if a relationship existed between learning styles and level of motivation. It was revealed that there is a potential in using video games in the classroom and it can be used as a motivational experience for all students regardless of their individual learning style. Apart from that, they also concluded that the extrovert would find educational video games motivating because of the hands-on activity but the introverts would prefer to think and watch before starting an activity (Grabe, Lombard, Reich, Bracken, & Ditton, 1999).

The literature has revealed that video games can be a useful tool to motivate learners and some games are preferred by people with different personality traits. Interestingly, Finley (2013) stated that there is no correlation between intrinsic motivation levels and learning styles, and the use of educational video games can be motivational for all students. The study concluded that future research must be done to get a more "definitive connection between learning styles and level of intrinsic motivation during video gameplay" (p .284).

As studies have shown that educational games can be beneficial and can be employed in classroom environment, this study further revealed that in a social based environment (e.g. classroom), gamers or learners of different personality type prefer different type of gaming consoles and in particular, different screen sizes. This study also concluded that in a classroom environment, a game-based educational tool and handheld console would be of great benefit to introvert learners due to their nature of preferring more private personal space. On the other hand, extrovert learners would benefit from larger screen size that is connected to a gaming console as larger screen size encourage social engagement.

Therefore, the results of this study could be used to inform educators to consider identifying the personality traits of the learners before embarking on using educational games and game consoles in a classroom environment.

6.3 Extrovert and Introvert Preference of Screen Size in Terms of Gaming: Contribution to the Literature

It has been discussed in literature reviewed in this chapter and the results of this study that gamers can be divided into extrovert and introvert personalities. The social engagement factor is the main factor that differentiates the two in this study. The extroverts prefer social interaction, which include the challenge when competing with other gamers and having audience watching them play the game and they prominently pointed out that they prefer playing on a big screen. As for the introvert gamers, being in their personal space significantly showed that the gamers prefer to play on their own personal screen or using the small-screen devices, especially in public areas.

This is not to say that the extroverts did not enjoy playing on small screen and the introverts did not enjoy playing on big screen entirely. The implication is that the gamers prefer a screen that corresponds to their personality type, especially in terms of social engagement and personal space. Table 6.6 shows the factors that influence the extroverts' preference on big screen and introverts' preference on small screen.

Table 6.6 Influence of screen size on extrovert and introvert gamers

Extrovert	**Factors that influence the preference of Big Screen** ▪ Allow high social interaction ▪ Having an audience ▪ Able to express emotion and verbal interaction openly ▪ Challenge other gamers openly during multiplayer
Introvert	**Factors that influence the preference of Small Screen** ▪ Privacy (uncomfortable with audience) ▪ Having more personal space with own individual screen ▪ Less distraction

As a conclusion, the present study has identified the importance of gamer's personality traits in determining intrinsic motivation on playing games on certain screen sizes. Game developers can take into consideration personality traits (extrovert and introverts) in their design process for E-rated games and education games that are played on either big screen or small screen consoles.

6.4 Enjoyment Theories (How Screen Size Plays a Role in Enjoyment)

Enjoyment was one of the results that predominantly emerged from the observation and the analysis of the data. I inductively classified five elements that influence enjoyment, namely focus and concentration, challenge, immersion, control, and social engagement (refer to Figure 6-1). These five elements appeared to have different influences on gamers when the two screen sizes were used in this study. Apart from that, some relation with the first theme on introvert and extrovert gamers were revealed but not for all categories. These five elements influence each other in terms of players' enjoyment.

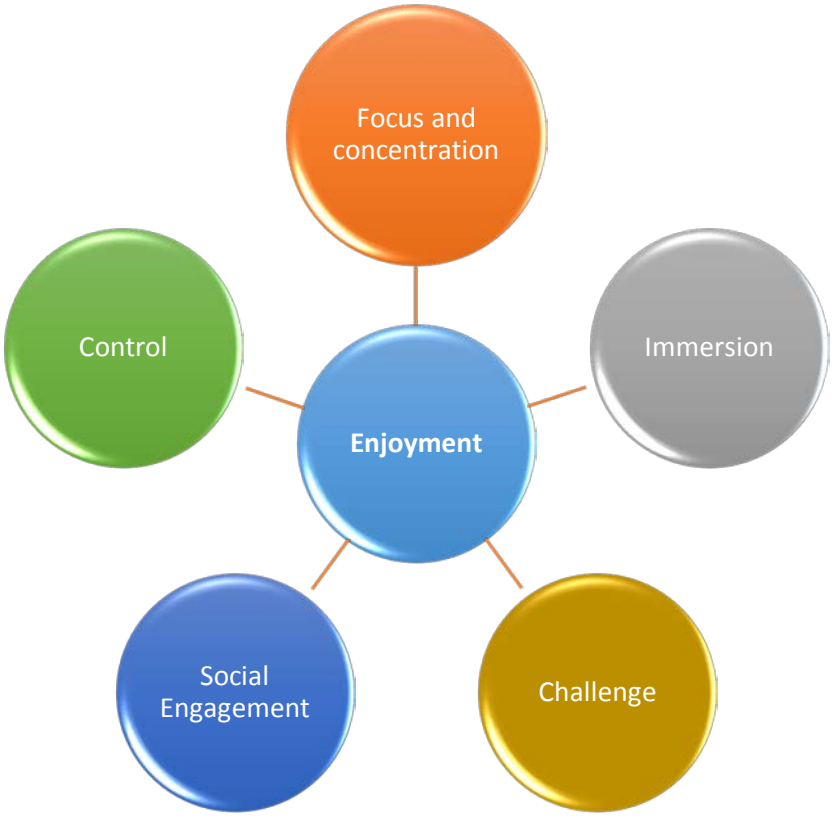


Figure 6-1 Elements of gaming enjoyment in relation to screen size

It was discussed in the literature that the flow theory can help designers to understand the balance of gamers' experiences in playing game when designing or evaluating a game. When gamers reached the flow experience, they feel the enjoyment, satisfaction and are intrinsically motivated to play the game with no regards for reward, difficulty or danger (Csikszentmihalyi, 1990). Figure 1-1 in chapter 1 shows the chart on the balance of the Flow Theory.

As discussed in Chapter 2, Csikszentmihalyi's (1990) identified eight major components of Flow in his research and personal observations:

- A challenging activity requiring skill;
- A merging of action and awareness;
- Clear goals;
- Direct, immediate feedback;
- Concentration on the task at hand;

- A sense of control;
- A loss of self-consciousness; and
- An altered sense of time.

Sweetser and Wyeth (2005) then mapped the flow theory with research on other previous literature and they carried out a survey that resulted in another theory called GameFlow: A Model for Evaluating Player Enjoyment in Games. This model enlisted eight criteria for player enjoyment in games, namely concentration, challenge, player skills, control, clears goals, feedback, immersion and social interaction. The GameFlow model focused on evaluating gamers' enjoyment in playing a particular game. Cowley et al. (2008) mapped the flow elements with their gameplay elements (see Table 6.7), which helped them prove their research hypothesis that "games can offer a particularly flow-inducing activity with a low-investment threshold" (p.11).

Table 6.7 The eight elements of flow and corresponding game play elements towards an understanding of flow in video games (Cowley et al., 2008)

Flow Elements	**Game play Elements**
A challenging but tractable task to complete	The complete gaming experience (including social interaction during gameplay).
Full immersion in the task, no other concerns intrude	High motivation to play, no imperative to do otherwise; empathetic to content.
Feeling of full control	Familiarity/skill with controller, genre conventions, game play mechanics.
Complete freedom to concentrate on the task	Telepresence [Steuer, 1995] and an environment dedicated to gaming.
The task has clear unambiguous goals	Missions, plot lines, levels; any explicit outcome of a successful play session.
Immediate feedback on actions	Well-timed, suitable rewards and penalties: contingencies [Hopson 2001].
Being less conscious of the passage of time	Focusing on another, temporally independent environment.
Sense of identity lessens, but is reinforced afterward	Embodiment in game avatar; sense of achievement after play – e.g. "Hi-Score"

The coding of data was done inductively in the analysis phase of this study and it was inevitable for the game flow theory and other literature to influence the wording of the coding and certain aspect of the analysis. For instance, the term enjoyment was initially coded as having fun and immersion was initially coded as lost track of time.

The five elements that were derived inductively from my data were supported by the literature, i.e. some factors and elements of the Flow theory and GameFlow Model. However, it might also be related to the enjoyment in gaming and simultaneously on the screen size that is used.

The theory arising from this study could contribute towards an understanding of gamers' enjoyment and intrinsic motivation particularly in relation to the use of game consoles and screen sizes. The theory could provide game designers and developers another attribute to consider when approaching game development.

6.4.1 Focus and Concentration & Immersion

> When playing either on a big screen or the small screen, the gamers would sit up and focus on the screen throughout the game. At first, I interrupted the gamers with questions but this seemed to annoy them or I was ignored by the gamers as if they could not hear me. Full attention was given to the game (looking at the screen). On a big screen, the gamers would lean forward towards the screen. Their eyes did not move away from the screen. The gamers fully concentrated on the game. [Observation Notes]

As mentioned in chapter 5 (section 5.5.1), concentration and focus play different roles in terms of screen sizes. Attention, focus and concentration in gaming is the ability for gamers to handle certain tasks while ignoring and filtering out irrelevant information (Jennett, Cox, Cairns, Dhoparee, Epps, Tijs, & Walton, 2008).

Being able to concentrate and fully focussed on the game brought about the feeling of being fully immersed in the gaming 'zone'. This is supported by Hoffman (2004), who found that the burn victims who played virtual reality video games felt less pain since they were being fully immersed in the game. The game flow theory and flow theory measure concentration as an element of enjoyment in games (Csikszentmihalyi, 1990; Sweetser & Wyeth, 2005). Poels, Kort & Ijsselsteijn (2007) explored the digital game experience and found that most of the focus group participants agreed that concentration was needed to perform well in games and to achieve the dimension of Flow.

There is, however a difference in experience when playing on small screen compared to big screen. The gamers pointed out that the ability of being able to concentrate and focus more on small screen gives a significant impact on enjoying educational games (Csikszentmihalyi, 1990; Sweetser & Wyeth, 2005). Szentgyorgyi et al. (2008) compared the gaming experience of playing on DS and the Wii and they explained that the DS has the advantage of portability and it "reduces the physical preconditions necessary for multiplayer gaming" (p. 1466). Gamers are free to determine which appropriate condition or environment they would choose to play the DS and "users need to be able to hold the DS and focus on it" (p. 1466). Also, the study indicated that the DS allows for a more personal space and the players were "focused on nothing but the game in progress". However, it was found that their study did not favour the DS in terms of social engagement. In this study, this was mentioned as an advantage for gamers who are introverts (prefer their own space) and those who prefer to play educational games in private.

In addition, the gamers in the present study commented that the level of distraction, the influence of the controls, the game design and the importance of personal space

influenced their concentration and focus in the gaming experience, which indirectly influenced their enjoyment of the games. It is noteworthy that the listed points are to the advantage of the small screen due to its ability to provide personal space, the simplicity of its controls, including the use of a stylus (for educational game) and the game designed also seemed to favour the Nintendo DS.

Concentration can be achieved if gamers' distraction is minimised and the games are able to attract their attention quickly and maintained throughout the gaming sessions (Sweetser & Wyeth, 2005). It has to be noted that I do not conclude that concentration on a big screen for both genres of games is non-existent. A high level of concentration that provides enjoyment to the gamers when playing on a big screen especially when playing Mario Kart was exhibited in this study. It is also apparent in this study that small-screen devices were preferred when playing the educational game.

Moving on, the concentration and focus also play a role in feeling immersed in a game. "Immersion in the game is promoted when all distractions are removed" (Johnson & Wiles, 2003, p. 1335).

> I noticed in my observation, when the gamers enter the building of the simulated gaming environment, they were nervous because the entrance was in an office area that was full of professors, lecturers and employees. As they sat down on the sofas and became familiar with the game, they started to feel more comfortable. In the middle of the first game, they have started to shout, laugh, jest, provoke, forgetting totally their environment. [Observation Notes].

> Most of the gamers who started the gaming session were worried about time and were promised that the gaming session would only last 1 hour at most unless they wanted to play more. They were surprised that after the gaming session end, they have decided to play and stayed for more than five hours. [Observation Notes]

I describe gamers who are immersed in a game as being lost in time. This is due to the fact that they are so involved in the game that they forget the world. The literature has proven that one can measure enjoyment by looking at the level of immersion a game evokes. The ability to lose track of time is influenced by the level of focus and concentration a gamer achieved through the elimination of distractions. Researchers have discussed how immersion is critical to enjoyment in games (Brown & Cairns, 2004; Jennett et al., 2008). As regards to this study, immersion in game has been measured by means of many aspects that are interrelated with the other elements of enjoyment. Brown and Cairns (2004) stated that immersion is used to "..describe the degree of involvement with a game.."(p. 2). They found that there are three levels of involvement, which are a) engagement, b) engrossment and c) total immersion. Engagement is the lowest level of involvement, in which the gamer must be willing to play the game and invest their time in the game and the controls. In engrossment, the construction of the game must affect the gamers' emotions. Lastly, the gamers stated that one must be "cut off from reality and detachment to such an extent that the game was all that mattered" to obtain total immersion (Brown & Cairns, 2004, p. 3).

The results of this study also pointed out that distraction plays a major role in determining the level of immersion. The higher the distraction, the lower the level of immersion of the gamers. In terms of screen size, I concluded that playing both screen sizes provide an acceptable level of immersion for gamers to enjoy the game. Both introvert and extrovert

gamers seemed to show that they are immersed in the game. However, it is worth noting that it still depends on the distraction that they have to face. Introverts do feel more distracted on big screen as they feel uncomfortable about people watching them playing the game. Playing multiplayer on big screen also provides distraction to both the introvert and extrovert gamers because of the split screen. Some gamers get confused and accidently looked at their opponents' screen. The others believed that it makes the gamers feel pressured when playing the game, especially if the gamer is losing.

6.4.2 Challenge & Social Engagement

> Gaming: To pass time, to learn of keep one's mind sharp, to be social and to engage in competitive play (Szentgyorgyi et al., 2008).

A game should provide the appropriate level of challenge to gamers so that they would enjoy the game. Furthermore, the design of the game should have an appropriate level of difficulty to provide positive gaming experience to the gamers (Pagulayan, Keeker, Wixon, Romero, & Fuller, 2002). This is also specified in the flow theory, which indicated that appropriate challenge must be provided in games to ensure that the gamers would not be either bored or frustrated (Csikszentmihalyi, 1990). It was also stated in the GameFlow model that there are four criteria in the challenge element to gain players' enjoyment, namely "a) games must match the players' skill level, b) games should provide different level of challenge for different players, c) the level of challenge should increase as the players progress through the game and increases their skill level and d) games should provide new challenges at an appropriate pace" (Sweetser & Wyeth, 2005, p. 5).

This is also supported by the data of the present study. The gamers felt the challenge when playing the Mario Kart game, as it is a competitive game. As for the educational game, the challenge was for the gamers to achieve a better grade. Challenge is of utmost importance to both extrovert and introvert gamers to enjoy a game. The gamers showed that they enjoy the competition and challenge provided by the games. The extrovert gamers exposed their emotion more and are more likely to enjoy the challenging aspect of the game because extrovert people are more energetic and attracted to activities (Johnson, Wyeth, Sweetser, & Gardner, 2012).

This study shows that challenge is related to being challenged in terms of social competition. This is because, the gamers showed much more enthusiasm when competing with another gamer. It was highlighted in the literature that gamers like physical social gaming because of the unpredictability, the challenging gameplay and interaction with other gamers. Gamers become more emphatic when sharing failures and victories with the others (Johnson & Wiles, 2003).

> Social competition can be regarded as a process which develops by competitive actions performed by individuals or social entities in order to maintain their own interest to the disadvantage of others" (Vorderer, Hartmann, & Klimmt, 2003, p. 4).

There was a significant difference between gamers who play on big screen and small screen. As mentioned earlier in this chapter, gamers who were extrovert prefer to play on big screen because of the opportunity to play in a crowd. The introverts, on the other hand showed a preference for playing on small screen due to privacy. Therefore, the use of Nintendo DS supported the preference of introverts when playing in a social environment. Szentgyorgyi et al. (2008) concluded that the participants felt that normal game consoles (ie. Nintendo Wii) were more social than the Nintendo DS as the Nintendo DS has less potential to support spectators. However, players who enjoy their personal space and do

not want to be watched prefer this. Reeves et al. (2005) described that large screen display enhanced the social experience because of its large and shared view especially during group gameplay. The gamers also emphasised that with a shared screen, they can strategise, observe the effects of their actions on others and comment on things that others are doing. Poels et al.'s (2007) categorisation of games as digital game experience indicated that the social dimension in game experience include enjoyment with others, being connected with others, empathy and cooperation. They also stated that accomplishment in a team and bonding as the digital post-game experience.

6.4.3 Control

An important element in games is the ease of use of the game controls and interface. Frustration in playing games usually leads to the gamer being dissatisfied with a game or the game consoles. Moreover, a gamer must be able to dictate the movement of the game with ease. A clear set of instructions on the game and controller must be provided before starting to play the game. The GameFlow model emphasised that "the players should feel a sense of control over their actions in the game" (Sweetser & Wyeth, 2005, p. 5). Notably, ample training and practice provide the gamers with a better experience in playing the game (Pagulayan et al., 2002).

This study has shown that the use of controller plays a significant role in the gamers' enjoyment. It has been discussed in terms of playing Mario Kart, in which the gamers (introvert and extroverts) felt comfortable using the Nintendo DS controllers because they are more familiar with it. The Wii Remote's sensitivity and motion control element distracted the gamers and seemed to lead to lots of frustration. Training is required for the gamers to be comfortable and efficient with the Wii Remote. With regard to using the

Nintendo DS, the gamers were comfortable and efficient. More games are won and the reason for this is the navigation pad and buttons for the Nintendo DS are familiar to the gamers as it is similar to the previous controller designs such as the PS2 (PlayStation 2) controllers. Also, the gamers commented that using the Nintendo DS when playing the educational game is also more comfortable because of the stylus, which is closer to the natural mapping of using a pen on paper.

Limperos et al. (2011) hypothesised that Wii controls would stimulate greater flow experiences and enjoyment than a traditional controller. Nevertheless, the results of their study proved otherwise. Players won more often on the PS2 and it was revealed that that they had more fun. “Additional analyses showed it was control, not performance, which mediated the relationship between control scheme and enjoyment” (p. 348). McEwan, Johnson,Wyeth & Blackler (2012) studied the difference of using an XBOX360 controller, a wireless speed wheel for Xbox 360 (a U-shape accelerometer) and an Xbox 360 wireless racing wheel (using a realistic tangible natural mapping divide) on a racing game. The results revealed that generally, participants performed better with controller. It was further concluded that the participants are more competent and felt less challenging with traditional devices than they were with devices that attempt to achieve realistic mapping. The participants did respond positively to the naturally mapped device even though they did not perform well with the device.

It is worth highlighting that the control over a game is important for both types of gamers as a gamer would prefer to have the power to decide, navigate, design and perform actions when playing a game (Sin et al., 2014). Furthermore, it is vital for a gamer to be comfortable and familiar with the game controls to enjoy a game. In this study, the WiiMote has been a challenge for most of the gamers. They took some time to be familiar

with its function and sensitivity. This has indirectly made them prefer the use of the Nintendo DS because its controllers are more traditional. In addition, I also conclude that the control factor of enjoyment is an imperative element in enjoyment. However, in answering the research question of this study, it does not have any impact on screen size.

6.5 Chapter Summary and Contributions

This chapter discussed the themes that inductively emerged, and the contribution of this study to theory. The contributions were discussed in relation to theory that emerged from this study and how it relates to additional reviews of the literature. The discussion was divided into two major sections. The first section discussed introvert and extrovert gamers and how screen sizes affected them when playing games. It can be concluded that extroverts prefer big screen due to social interaction, and introvert prefer small screen due to personal space. Then, the chapter continued to explain the result of this study in relation to the use of video games in education, particularly in the classroom environment. It is deemed beneficial to identify the type of learners before introducing games and game consoles in classroom environment.

The second section described how screen sizes play a role in enjoyment and explain the enjoyment elements that were derived from the data. These elements, i.e. concentration, focus and immersion are interrelated. The aspect of having social interaction and competition provide challenge to the gamers. It is also important for gamers to have control when playing the game in order for the gamers to be immersed, focused and appropriately challenge during the gaming session.

The contribution of the study has highlighted the significance of the results to game developers, game designers and educators in general. The results of this study can also be a reference for academicians and researchers to explore intrinsic motivation on other game genres, screen displays such as 3D monitors, or other devices that support gaming.

Finally, the present study successfully employed an ethnographically-informed method and Simulated Gaming Environment (SGE)) as the "*field*" to collect participant observation to understand the effect of screen size on gamers' intrinsic motivation during gameplay. There has been a dearth of evidence that has been acquired in a naturalistic observational context. Much of the literature is populated with survey and experimental research. This research study fulfils a need for empirical observational studies, both in content, and in contribution to the research methodology. The following chapter will conclude the research by describing the main objectives, limitations and recommendation for future research.

7. CONCLUSION

7.1 Introduction

The conclusions below were drawn in relation to the main research question and the main objective of the present study. To recapitulate, the main research question of this study is "Does screen size affect gamers' intrinsic motivation when playing video games?" If so, "How does screen size effect gamers intrinsic motivation?"

The answers to these questions were presented in sections 6.2 to 6.4, in which the themes that emerged from the findings and how screen size had an impact on the gamers were discussed. The term "intrinsic motivation" did not clearly emerge from the data; however, in considering literature along with the results obtained in this study, it can be concluded that there is a relationship between intrinsic motivation and enjoyment. Furthermore, a few other factors that influence gamers, but which do not relate to screen size, are also discussed in the research as they can also be important influences on gamers' motivation.

7.2 Publication from the thesis.

During my PhD journey, I managed to publish two conference papers and one journal paper. The first two publications, entitled Simulated Gaming Environment for Ethnography Research and The usefulness of a Simulated Environment in Ethnography Research for Gaming and HCI, discussed the use of SGE as a natural environment for ethnographic research. The papers reported two studies that used the SGE for studying the intrinsic motivation of gamers when playing games on different screen sizes. (Note

that the second author's contributions to the papers referred to a different project that involved a driving simulator.)

The third paper, *Motivation of Extrovert and Introvert Gamer's using Different Screen Sizes*, discusses on how the gamers' personality type can determine their motivation in choosing the screen size of a game. The list of papers published and mentioned throughout this thesis are as follows:

Zainal Abidin, N. F., & Wellington, R. J. (2011). *Simulated Gaming Environment for Ethnography Research*. Paper presented at the Proceedings of the 4th Annual International Conference on Computer Games, Multimedia and Allied Technology, Penang, Malaysia.

Zainal Abidin, N. F., & Wellington, R. J. (2014). The Usefulness of a Simulated Environment in Ethnographic Research for Gaming and HCI. *GSTF Journal on Computing*, *1*(4).

Zainal Abidin, N. F., & Wellington, R.J. (2013). Motivation of Extrovert and Introvert Gamer's using Different Screen Sizes. Paper presented at the Proceedings of The Asian Conference on Society, Education, and Technology, Osaka, Japan.

7.3 Method: Using Ethnographically-Informed and SGE for Gaming Studies and the Understanding of Gamers' Behaviour

As discussed in chapters 3, and 4, this study employed ethnography as a guideline for the conduct of the research. I believe that this method is effective in capturing the gamer's behaviour as well as understanding gaming culture. The use of the SGE was successful in terms of providing a "natural" environment for gamers. This study concludes that participant observation enabled the researcher to feel, understand, be immersed, and have hands-on experience with the gamers. I managed to get data that reflects the gamers' behaviour, opinions, feelings, like and dislikes as related to this study. Therefore, using ethnographically-informed approach and SGE in this study successfully enabled me to answer the research question and achieve the study's objectives.

7.4 Main Objective: To Study the Potential Effect of Screen Size on Gamers' Intrinsic Motivation when Playing Games

In achieving the main objective of the study, I consider the research outcomes in relation to four subtopics.

7.4.1 The Relationship of Enjoyment to Intrinsic Motivation when Playing Games

Intrinsic motivation is the feeling of enjoyment and interest in doing certain activities without any outer encouragement or extrinsic reward (Ryan & Deci, 2000). As explicated in the results and discussion section of this current study, a couple of themes and subthemes were, derived inductively, that relate to a gamers' enjoyment in playing a game that indirectly or directly makes them feel intrinsically motivated in playing the games. As discussed in point 2.4, and point 2.5, literature have shown that the motivation to play a game can range from the type of game, the content of the game, the popularity of the game, and the enjoyment factor of the game. From this research, I conclude that to be intrinsically motivated to play a game will depend on the enjoyment factors encountered when playing the game and the type of gamer.

To feel intrinsically motivated, a gamer must feel enjoyment when playing the game. Five elements were identified in this study, namely focus and concentration, challenge, immersion, social engagement, and control. These elements play a significant role in a gamer's enjoyment while playing a game. As discussed in section 6.4.1, focus and concentration, and the immersion element, imply that a gamer must feel that they are fully engrossed in the game, to achieve enjoyment. This is due to the fact that these elements allow gamers to master the game and feel satisfied in achieving their task. The element of challenge provides human satisfaction by providing gamers the feeling of

accomplishment, competitiveness and excitement. The experience of gaming will be enjoyable and intrinsically motivating as the gamers are able to challenge their own skills, or other gamers. The social engagement element allows the gamers to experience friendship, social interaction, alliances, competition, and challenge. It provides enjoyment as gamers have the chance to socialise and interact with other gamers and show their skills in the game. The last element, control, indicates that to enjoy and feel intrinsically motivated to play a game, a gamer must have the feeling of control over the game. They should have the ability to take charge on how to go about the game or how to play the game. The present study discusses control in relation to the use of controllers in the game. The more comfortable and familiar a gamer in using the controllers of the game, the more satisfied they were and they had more fun with the game.

7.4.2 The Influence of Personality Type on Enjoyment and Intrinsic Motivation when Playing Games on Different Screen Sizes

In this research, a theme that unexpectedly emerged from the data showed that screen size preferences are determined by each gamer's personality (introvert or extrovert). As was discussed previously in this thesis, the extrovert gamers prefer playing games on big screen size due to its support for social interaction, whereas the introvert gamers prefer small screen size because it provides personal space. An extrovert gamer feels enjoyment and is intrinsically motivated playing on a big screen during multiplayer sessions as he or she can compete openly with the person next to them. They also find satisfaction in expressing their emotion and verbally goading and joking around with their opponent. Moreover, they are motivated to play repeatedly no matter whether they lose or win the game, as long as there is competition. On the contrary, an introvert gamer prefers privacy and their own personal space since, they feel uncomfortable in an open environment and thus, a small screen handheld console is more suitable for this type of gamer. They would

be able to play multiplayer or individual games comfortably without being distracted by people watching them playing the game. Also, they prefer to play quietly and in their own personal space.

In relation to the enjoyment element and the personality type of gamers, the present study found that small screen device helps gamers to focus and concentrate more on a game. To be able to feel immersed in a game, and to be focused and concentrate in a game, is to be able to lower the level of distraction when playing the game. For introvert gamers, playing on smaller screen would decrease the level of distraction because they can stay in their own personal space without other people watching them playing as they are more sensitive to external influences. Both introvert and extrovert gamers feel that playing on a bigger screen during multiplayer games can sometimes cause distraction because of the split screen settings. This is because the gamers can sometimes feel confused by accidently looking at other gamers' screens. While playing the game, some gamers feel pressured and stressed out when they look at other gamers' status. However, the extroverts find that social interaction and looking at other gamers' status during gameplay as a motivation to play because it builds up the excitement of gameplay. Most importantly, both types of gamers have to feel challenged during gameplay and have control over the game.

Figure 7-1 presents the relationship between the type of gamers and enjoyment elements, and their influence on intrinsic motivation for gaming in accordance with screen size. This study also found that the type of gamers (introvert or extrovert) has a significant effect on the intrinsic motivation of gaming. The elements of enjoyment would impact the type of gamers differently when it comes to screen sizes.

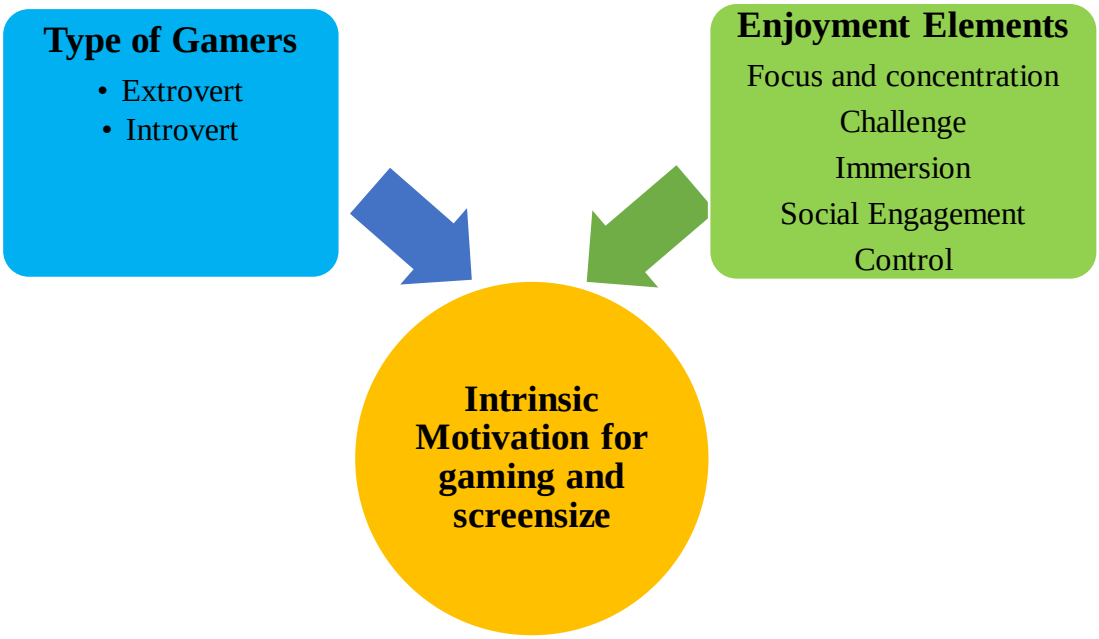


Figure 7-1 The relationship diagram between personality type of gamers, and enjoyment element towards its effect on intrinsic motivation for gaming according to screen size

7.4.3 The Use of Small Screen Handheld Consoles as an Intrinsically Motivating Device for Gaming (Racing Kart Action Game) and Learning (Educational Puzzle Game)

Section 6.2, of this thesis discussed that gamers can be intrinsically motivated in playing a game according to which type of gamer they are. Other than its portability, controller type and the game design, the small screen size of handheld game consoles does motivate gamers to play the game in certain situations. Based on findings of this study, it is safe to conclude that both types of gamers felt immersed, challenged, and focused (showing concentration) when they play the racing game on a small screen. Introvert gamers seemed to feel that they can focus and concentrate more when playing on a small screen. Also, they feel more comfortable playing on the small screen due to its ability to provide privacy. However, gamers also indicated that the game design and graphics on the big screen make the action kart racing game more fun than on the small screen game console.

The benefits of educational games are discussed in section 6.2.3 in this study. Upon reviewing the literature in chapter two, it is noteworthy that there is potential for using consoles based games in classroom. Nevertheless, it was found in the findings of this study that it would be beneficial to first identify the type of gamers and learners that are in the classroom. This is due to the fact that the suitable consoles and screen size as well as the activity can be assigned in accordance to the type of personality the learners have. Futhermore, it is concluded that small screen game consoles could benefit introvert learners whereas big screen consoles better support extrovert learners.

7.4.4 Other Findings That Affects the Motivation of Gamers When They Play Game on Different Consoles and Displays

As is common in ethnographic studies, findings emerged from the data that were not considered during earlier stages of the research. I found that there are two elements that can influence a gamer's motivation for playing a game that do not relate to screen size, which are 1) the type and design of the game and 2) the controller of the game.

1) The type and design of the game

The genre and popularity of a game can influence a gamer to start playing a game (Sin et al., 2014). The gameplay, design, and content of a game can then ignite the gamers' motivation to continue playing the game until it is finished. To reiterate, Mario Kart has received good reviews and is sold worldwide. It is a popular game for both the Nintendo Wii and the Nintendo DS. This game is satisfying and enjoyable for all the participants that played the game. Conversely, the educational game chosen for this study, which is the Big Brain Academy, was not a popular choice among the participants. They found it rather boring and participant commented that the version on the DS was more bearable

because it has a timer, variety of questions and more challenging. Based on my observation, the Big Brain Academy was still a good start in comparing the use of an educational puzzle game that tested gamers' arithmetic's skills on a big screen and a small screen. Furthermore, it was also the best choice of educational game available during this current study which also shows that there are still difficulties for game developers to create an engaging and motivational educational game. Therefore, more research needs to be done to provide useful guidelines for game developers who are interested to venture in education game design.

2) The controller of the game

As discussed in section 6.4.3, the controller plays a major role in giving gamers enjoyment and the feeling of being immersed in the game. The comfort and familiarity of using a controller will influence the gamers' willingness to continue the game. Once gamers master the use of using a certain type of controller they will feel motivated and enjoy the game more. This will prompt the gamer to play the game longer.

7.5 Limitations and Future Research

All research has constraints and limitations, as well as future directions for research. As for my study, there are a few constraints to be mentioned here along with recommendations for further research.

One such constraint relates to the participants involved in the study. The sampling method chosen was purposive sampling, where I specified the age and skill of gamers. I did not, however, specify a gender preference for this study or a need for the sample to be gender balanced. In spite of extensive advertisement, snowballing, emails, and face-to-face

invitations, only one female participant volunteered. Unfortunately, she did not spend a lot of time in the SGE and she was also a novice gamer with no experience playing a racing game. The outcome of the research might differ if there were an equal number of female participants in the study. Therefore, for future research a more specific gender-based study might be appropriate to understand if there are any gender differences in playing across different screen sizes and sampling different personality types.

After a definite theme emerged in terms of the types of gamers who are introvert or extrovert the participants were categorised by observation based on guidelines provided in the literature. Extra interviews were also conducted via email or Facebook after the results were determined, to seek gamers' confirmation on their respective classification (refer to section 3.7.3, and 4.4.1). I feel that my study could have benefited from my conducting a background survey using something like the Myers-Briggs' or Big Five Factor questionnaires to inform the types of gamers being studied. I recommend that other researchers could explore the idea of focusing game design studies and screen preference studies by first determining what type of gamers make up their sample. Game designers could also take gamers' personalities and screen size preferences into consideration when designing games.

This study serves as a stepping-stone in understanding the use of small screen gaming devices as a learning tool in universities, schools, and the classroom environment. The results of this study can be guideline for future studies that focus on evaluating students learning type and screen preferences. Then, researchers and educators could focus on a specific topic using an education game to teach students based on their learning styles. Furthermore, as mentioned in the thesis, after conducting the study, the Big Brain Academy game was found to be rather boring and not challenging for the gamers. Other

research could be undertaken using a more challenging and fun educational game. The challenge would be to find or to create such an educational game for both television-based console games and a handheld console so that experiences could be compared.

Finally, this study focused on two devices and screen sizes. Other game consoles and screen sizes could be studied, as could the use of tablets such as the IPAD, Galaxy TAB, NVidia Shield, or the Microsoft Surface for gaming or learning.

7.6 Chapter Summary and Concluding Remarks

This chapter has summarised at a suitably high level the results and implications of the present study. The limitations of the research have also been identified. Recommendations for future research that could benefit the game industry as well as the education industry were also highlighted.

Conducting ethnographically-informed research on motivation, video games enjoyment, and gamers' personalities in relation to screen size was challenging, but rewarding. The question as to which size is better was not as easy to answer as I had believed it would be when embarking on the PhD journey – but answer it we did. The success of using ethnography and a SGE was a significant contribution to gaming research. The inductive and naturalistic nature of the study provided rigorous data that underpinned the final result of this research work. An understanding that screen size plays a significant role in affecting gamers' motivation, mediated by elements of enjoyment and gamer type, is another important contribution of this research. The importance of identifying gamers' or learners' personality types and including the elements of enjoyments for gaming provides for an intrinsically motivating gaming or learning experience. The research argues that

such understandings should be considered before introducing gaming or the usage of games consoles in a classroom environment. Finally, the present study concludes that the elements of enjoyment and types of gamer contribute to the effect of screen sizes on gamers' intrinsic motivation when playing games.

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9. APPENDIXES

APPENDIX A: Ethics Approval

MEMORANDUM

Auckland University of Technology Ethics Committee (AUTEC)

To:	Robert Wellington
From:	**Charles Grinter** Ethics Coordinator
Date:	6 July 2011
Subject:	Ethics Application Number 11/16 **The effect of screen size on gamers' intrinsic motivation when playing games of a different genre.**

Dear Robert

Thank you for providing written evidence as requested. I am pleased to advise that it satisfies the points raised by the Auckland University of Technology Ethics Committee (AUTEC) at their meeting on 14 February 2011 and I have approved your ethics application. This delegated approval is made in accordance with section 5.3.2.3 of AUTEC's *Applying for Ethics Approval: Guidelines and Procedures* and is subject to endorsement at AUTEC's meeting on 25 July 2011.

Your ethics application is approved for a period of three years until 6 July 2014.
I advise that as part of the ethics approval process, you are required to submit the following to AUTEC:

- A brief annual progress report using form EA2, which is available online through http://www.aut.ac.nz/research/research-ethics/ethics. When necessary this form may also be used to request an extension of the approval at least one month prior to its expiry on 6 July 2014;
- A brief report on the status of the project using form EA3, which is available online through http://www.aut.ac.nz/research/research-ethics/ethics. This report is to be submitted either when the approval expires on 6 July 2014 or on completion of the project, whichever comes sooner;

It is a condition of approval that AUTEC is notified of any adverse events or if the research does not commence. AUTEC approval needs to be sought for any alteration to the research, including any alteration of or addition to any documents that are provided to participants. You are reminded that, as applicant, you are responsible for ensuring that research undertaken under this approval occurs within the parameters outlined in the approved application.

Please note that AUTEC grants ethical approval only. If you require management approval from an institution or organisation for your research, then you will need to make the arrangements necessary to obtain this.

When communicating with us about this application, I ask that you use the application number and study title to enable us to provide you with prompt service. Should you have any further enquiries regarding this matter, you are welcome to contact me by email at ethics@aut.ac.nz or by telephone on 921 9999 at extension 8860.
On behalf of AUTEC, I wish you success with your research and look forward to reading about it in your reports.

Yours sincerely
Charles Grinter
On behalf of Dr. Rosemary Godbold and Madeline Banda **Executive Secretary**
Auckland University of Technology Ethics Committee
Cc: Noor Fardela binti Zainal Abidin dzainala@aut.ac.nz, fardelaz@gmail.com

APPENDIX B: Advertisement

ADVERTISEMENT

Participant Recruitment for Video Game research

Hello, I am currently conducting research on studying the effect of gamers' intrinsic motivation when playing games of a certain genre on different screen sizes for my PhD studies. I am looking for experience gamers (age 18 to 45) to join this study.

If you:

- Are familiar with various game consoles (e.g. Nintendo Wii and Nintendo DS) and game genres (e.g. education game and action platform games).
- Include games as part of your daily / weekly activity.
- Are willing to spend your time to share your thought, perception and game experiences.
- Are interested to join this research journey and have a little fun.

Please contact me at dzainala@aut.ac.nz

Thank you.

Noor Fardela Zainal Abidin

WT127, HCI lab,
School of Computing and Mathematical Science,
Auckland University of Technology,
Auckland, New Zealand.

APPENDIX C: Participant Information Sheet

Participant Information Sheet

Date Information Sheet Produced:
01 February 2011

Project Title
The effect of screen size on gamers' intrinsic motivation when playing games of a different genre

An Invitation
Hello, my name is Noor Fardela Zainal Abidin (Della) and I am currently undertaking my doctoral programme at Auckland University of Technology (AUT). My research is to study gamers' intrinsic motivation in playing games of a certain genre on different screen sizes. I thank you for showing some interest in my research and I would like to invite you to participate in this research. Your participation is voluntary and you can withdraw at any stage prior to the completion of the study.

What Is the Purpose of This Research?
The purpose of this research is to study the effect of screen size on gamers' intrinsic motivation when playing games of a different genre. The study hopes to gain an understanding of the influence of screen sizes when playing video games particularly in the positive gaming genres (e.g. educational games). This project will lead to the completion of my doctoral study at AUT. I also plan to employ the data for conference proceedings and other referred publications.

How Was I Identified and Why Am I Being Invited to Participate in This Research?
You have responded to an advertisement for gamers, interested in testing video games that will be played on two different screen sizes using to different type of game consoles (Nintendo Wii and Nintendo DS). Up to 20 participants are expected to provide data to help with this research, and I will be conducting research over a few months. Participants will be accepted on a first in basis, so if there are too many participants at a particular stage, we will inform you immediately but we will also ask if you are willing to participate later.

What Will Happen in This Research?
You will, essentially, play a game. Video will be recorded on how you interact with the games chosen, game consoles and screen size. You would be encouraged to voice out any comments you have when playing the game but this is entirely up to you. You might be asked to attend more than one play session. Just remember that we are not testing your performance of the game, we are here to get your perception on the technology. However, we would be monitoring your emotion and behaviour during game play. After your session on playing the game is completed, we would have a 30 minutes conversation on

any extra input you wish to share on your experience playing the games. You also might be requested to return for a "Stimulated Recall Interview" where some question might be asked while we are viewing a video of you playing the game. Your participation in any sessions (e.g. interview, stimulated recall interview) of this research is purely voluntary and you may choose to withdraw at any stage prior to the data analysis.

What Are the Discomforts and Risks?
There will be no intended discomfort or risk in this research. However, you may be reluctant to share your experience or your opinions with me. You may also find the game difficult, or the environment uncomfortable, but the intention is to create a gaming environment that is natural and comfortable to the gamer.

How Will These Discomforts and Risks Be Alleviated?
The participant observation and interviews will be conducted in ways that you are comfortable with. At any time during the interviews and observation, you may choose not to be observed or answer any interview questions. You will have the opportunity to clarify, edit or omit your statements before I use the data in this project. You may also withdraw yourself or any information that you have provided for this project at any time before the data is analysed. If you withdraw from the project, all relevant information including notes, audio recording, and transcripts, or parts thereof, will be destroyed.

What Are the Benefits?
You will be assisting me in completing my PhD thesis. I will learn much more about the effects of games and games media from your contributions. I hope that you will benefit from the opportunities to reflect on and share your experience and ideas on gaming culture and education. I also hope that you will have a little fun.

How Will My Privacy Be Protected?
Your anonymity, privacy and confidentiality will be protected in this research. I will not use real names in my research report or any publication. Any direct quotes will be presented as pseudonyms. Additionally, I will delete any identifiable personal information to ensure privacy and confidentiality of my research participants. Some elements of the video may be used in publication to illustrate the research findings however your face or any identifiable features will not be displayed in any way. All data and consent forms will be stored separately in locked cabinets in the a locked cabinet (WT101A) at the School of Computer and Mathematical Sciences,(remove) AUT for six years. All original data will be destroyed after six years.

What Are the Costs of Participating in This Research?
You may contribute as much or as little time as you are willing to. You will be informed of the time slot sessions available, if you wish to participate at a particular time please contact us and indicate your availability.

What Opportunity Do I Have to Consider This Invitation?
If you like to volunteer as a research participant for this project, please get back to me within two weeks of being provided this information.

How Do I Agree to Participate in This Research?
If you agree to participate, please complete the attached consent form and return it to me (Noor Fardela Zainal Abidin)

Will I Receive Feedback on the Results of This Research?

If you wish, I will send you an electronic version of the summary of my research findings at an email address you provide. If you are interested, I will also inform you of any imminent publications concerning the findings of this project.

What Do I Do If I Have Concerns About This Research?

Any concerns regarding the nature of this project should be notified in the first instance to the Project Supervisor, *Dr. Robert Wellington*, *RWelling@aut.ac.nz*, *and 09 921 9999 ext 5432*.

Concerns regarding the conduct of the research should be notified to the Executive Secretary, AUTEC, Madeline Banda, *madeline.banda@aut.ac.nz*, 921 9999 ext 8044.

Whom do I contact for further information about this research?

Researcher Contact Details:

Noor Fardela Zainal Abidin (email: dzainala@aut.ac.nz or 09 921 9999 ext 5831)

Project Supervisor Contact Details:

Dr. Robert Wellington,RWelling@aut.ac.nz, and 09 921 9999 ext 5432.

Prof. Stephen MacDonell smacdone@aut.ac.nz and 09 9219073

Approved by the Auckland University of Technology Ethics Committee on *6 November 2011*, AUTEC Reference number *11/16*.

APPENDIX D: Consent Form (individual)

Consent Form

Project title: ***The effect of screen size on gamers' intrinsic motivation when playing games of a different genre***

Project Supervisor: ***Dr. Robert Wellington***

Researcher: ***Noor Fardela Zainal Abidin***

- ○ I have read and understood the information provided about this research project in the Information Sheet dated 1 February 2011.
- ○ I have had an opportunity to ask questions and to have them answered.
- ○ I understand that notes will be taken during the observation and that they will also be videotaped and transcribed.
- ○ I permit the researcher to use the video that are part of this project and/or any drawings/photographs from them and any other reproductions or adaptations from them, either complete or in part, alone or in conjunction with any wording and/or drawings solely and exclusively for (a) the researcher's thesis; and (b) publications
- ○ I understand that the video/photographs will be used for academic purposes only will not be published in any form outside of this project without my written permission.
- ○ I understand that some elements of the video may be used in publications or thesis to illustrate the research findings however my face, any identifiable features and personal information would remain confidential and will not be displayed in any way.
- ○ I understand that notes will be taken during the interviews, the stimulated recall interview and that they will also be audio taped and transcribed.
- ○ I understand that I may withdraw myself, my image, or any other information that I have provided for this project at any time prior to completion of data collection, without being disadvantaged in any way.
- ○ If I withdraw, I understand that all relevant information including tapes and transcripts, or parts thereof, will be destroyed.
- ○ I agree to take part in this research.
- ○ I wish to receive a copy of the report from the research (please tick one): Yes○ No○

Participant's signature: .....

Participant's name: .....

Participant's Contact Details (if appropriate):
……..
……..
Date:

Approved by the Auckland University of Technology Ethics Committee on 6 November 2011 AUTEC Reference number 11/16

Note: The Participant should retain a copy of this form.

APPENDIX E: Consent Form (multiplayer)

Consent Form

For use during multiplayer sessions.

Project title: ***The effect of screen size on gamers' intrinsic motivation when playing games of a different genre***

Project Supervisor: ***Dr. Robert Wellington***

Researcher: ***Noor Fardela Zainal Abidin***

- ○ I have read and understood the information provided about this research project in the Information Sheet dated 1 February 2011.
- ○ I have had an opportunity to ask questions and to have them answered.
- ○ I understand that identity of my fellow participants and our discussions in the multiplayer session is confidential to the group and I agree to keep this information confidential.
- ○ I understand that notes will be taken during the observation and that they will also be videotaped and transcribed.
- ○ I permit the researcher to use the video that are part of this project and/or any drawings/photographs from them and any other reproductions or adaptations from them, either complete or in part, alone or in conjunction with any wording and/or drawings solely and exclusively for (a) the researcher's thesis; and (b) publications
- ○ I understand that the video/photographs will be used for academic purposes only will not be published in any form outside of this project without my written permission.
- ○ I understand that some elements of the video may be used in publications or thesis to illustrate the research findings however my face, any identifiable features and personal information would remain confidential and will not be displayed in any way.
- ○ I understand that notes will be taken during the interviews and the stimulated recall interview and that they will also be audio taped and transcribed.
- ○ I understand that I may withdraw myself or any information that I have provided for this project at any time prior to completion of data collection, without being disadvantaged in any way.
- ○ If I withdraw, I understand that while it may not be possible to destroy all records of the multiplayer's discussion of which I was part, the relevant information about myself including tapes and transcripts, or parts thereof, will not be used.
- ○ I agree to take part in this research.
- ○ I wish to receive a copy of the report from the research (please tick one): Yes○ No○

Participant's signature: .....

Participant's name: .....

Participant's Contact Details (if appropriate): …… ……....

Date:

Approved by the Auckland University of Technology Ethics Committee on 6 Novermber 2011 AUTEC Reference number 11/16

Note: The Participant should retain a copy of this form.

APPENDIX F: Observation Protocol

Observation Protocol

(Post Consent Process)

1. The researcher begins by making sure that all equipment (television, game consoles, games, video recording devices) are ready and running.
2. The researcher will make sure that refreshment is available and arranged on the table.
3. The researcher will welcome the participant and introduce the gaming environment.
4. The researcher will explain the observation protocol for this study.
5. The researcher would ask if the participant has any questions.
6. The participant would be reminded that their game play session would be recorded from various angles.
7. The participant would be told that he/she would be allowed to stop the recording at anytime during game play.
8. The participant would be inform that they are encouraged to talk aloud their feelings, opinion or comment during game play, however they can choose not to.
9. The researcher would invite the participant to play the game using a particular screen. The participant would be given the freedom to choose which console and game they wish to begin with. There would be two (2) game consoles (Nintendo Wii and Nintendo DS) provided. The games provided are The Big Brain Game Academy (educational plus puzzle game) and the Super Mario Bros (action platform game).
10. Before game play session begins, the researcher will ask if the participant is comfortable and then will on the camera.
11. The participant will then begin game play.
12. During game play, the researcher might ask some questions to clarify statements or expressions made by the participants.
13. Once the participant finished playing a stage of the game on the first game console they chose. The camera will be turn off.
14. The researcher would ask whether the participant wish to continue with the game or begin game play on another consoles.
15. If the participant chose to continue playing, the video camera would be on again.
16. If the participant chose to start with the next game console, the participant would be asked to play the same game genre that he/she has chosen for the previous game console. The video camera would be on for this game play session.
17. The participant would be reminded that they might to be ask to return for another session of game play.
18. Once the one (1) hour session is finish, the participant would be asked whether they wish to continue for another session. The amount of session offered per participant per day is three (3) sessions.
19. When the participant request to stop game play. The camera will be turn off and the participant is invited to join a 30 minutes interview session.
20. The participant would be reminded that the interview would be audio taped and he/she is free to choose not to answer any question that they feel uncomfortable with.
21. After the interview session the participant would be informed that he/she might be invited to return for a stimulated recall interview session.
22. The researcher would thanks the participant and invite he/she for some refreshment.
23. The researcher would remove the tape and store it in the cabinet.

Observation Protocol (Individual)

(Post Consent Process)

Pre-Observation

1. Make sure that all equipment (television, game consoles, games on standby mode, video recording devices) are ready and running. Label participant's tapes with individual codes.
2. Make sure that refreshments are arranged on the table.
3. Welcome the participant and introduce the gaming environment.
4. Explain the important steps and options of the study.
5. Inquire if the participant has any questions.
6. Remind the participant that game play sessions would be recorded from various angles.
7. Inform the participant that he/she would be allowed to stop the recording at anytime during game play.
8. Inform the participant that they are encouraged to talk aloud their feelings, opinion or comment during game play; however they can choose not to.
9. Invite the participant to play the game using a particular screen. The participant would be given the freedom to choose which console and game they wish to begin with. There would be two (2) game consoles (Nintendo Wii and Nintendo DS) provided. The games provided are The Big Brain Game Academy and the Super Mario Bros.
10. Before game play session begins, ask if the participant is comfortable
11. Switch on the camera.

During Observation

12. Participant will begin game play.
13. Ask some questions to clarify statements or expressions made by the participants.
14. Once the participant finished playing a stage of the game on the first game console they chose.
15. Ask whether the participant wish to continue the game or begin game play on another consoles.
16. If the participant chose to continue playing, observation continues.
17. If the participant chose to start with the next game console, the participant would be asked to play the same game genre that he/she has chosen for the previous game console.
18. Once the one (1) hour session is over, the participant would be asked whether they wish to continue for another session. The amount of session offered per participant per day is three (3) sessions.
19. Remind participant that they might to be asked to return for another session of game play.

Post Observation

20. When the participant request to stop game play. Turn off camera and invite participant to join a 30 minutes interview session.
21. If a participant does not agree for an interview session, offer he/she refreshments.
22. If a participant agrees for the interview, remind the participant that the interview would be audio taped and he/she is free to choose not to answer any question that they he/she uncomfortable to answer.
23. Informed the participant that he/she might be invited to return for a stimulated recall interview session.
24. Thank participant and invite he/she for some refreshments.
25. Remove the tape and store it in the cabinet for analysis.

APPENDIX H: Observation Protocol (Multiplayer)

Observation Protocol (Multiplayer)

(Post Consent Process)
Pre-Observation

1. Make sure that all equipment (television, game consoles, games on standby mode, video recording devices) are ready and running. Label participants' tapes with individual codes.
2. Make sure that refreshments are arranged on the table.
3. Welcome the participants and introduce the gaming environment.
4. Introduce the all participants involved in the session to each other.
5. Explain the important steps and options of the study.
6. Inquire if the participants have any questions.
7. Remind the participants that game play sessions would be recorded from various angles.
8. Inform the participants that they would be allowed to stop the recording at anytime during game play.
9. Inform the participants that they are encouraged to talk aloud their feelings, opinion or comment during game play; however they can choose not to.
10. Invite the participants to play the game using a particular screen. The participants would be given the freedom to choose which console and game they wish to begin with. However all participant should agree to play the same game, game console and screen size. There would be two (2) game consoles (Nintendo Wii and Nintendo DS) provided. The games provided are The Big Brain Game Academy and the Super Mario Bros.
11. Before game play sessions begins, ask if the participants are comfortable
12. Switch on the camera.

During Observation

13. Participants will begin game play.
14. Ask some questions to clarify statements or expressions made by the participants.
15. Once the participants finished playing a stage of the game on the first game console they chose.
16. Ask whether the participants wish to continue the game or begin game play on another console.
17. If the participants chose to continue playing, observation continues.
18. If the participants chose to start with the next game console, the participants would be asked to play the same game genre that he/she has chosen for the previous game console.
19. Once the one (1) hour session is over, the participants would be asked whether they wish to continue for another session. The amount of session offered per day is three (3) sessions.
20. Anyone can stop playing at any time they wish. However, observation will only stop if there is only one participant left.
21. Remind participants that they might to be asked to return for another session of game play.

Post Observation

22. When all participants request to stop game play. Turn off camera and invite participants to join a 30 minutes individual interview session.
23. If participant does not agree for an interview session, offer participant refreshment.

24. If participant agree for the interview, remind participant that the interview would be audio taped and he/she is free to choose not to answer any question that they feel uncomfortable to answer.
25. Informed that participant might be invited to return for a stimulated recall interview session.
26. Thank participant and invite he/she for some refreshment.
27. Remove the tape and store it in the cabinet for analysis.

APPENDIX I: Indicative Interview Questions

Indicative Interview Questions

(Post Consent Process)

30 minute interview session

This individual interview with the participant is designed to allow the researcher to get a further understanding and explanation on the participant opinions and feeling during the game play sessions. It is anticipated that specific interview questions being asked will be based on the participants answer to the previous questions. The nature of the interview would be conversation like and open ended.

Most of the question arise are based on the observation of the game play session. Questions would be to clarify participant actions or emotion displayed during game play. Questions would be based on repetitive actions, emotions, and experiences. Examples of questions that might arise due to the observation are

1. Can you describe your experience during game play session?
2. Is there anything you did not expect or feel surprise about?
3. I noticed during stage XX you paused for a little while, can you explain the reason for the pause?
4. At the end of stage XX you had a big smile on your face, would you mind explaining the reason for this.
5. Game play for stage XX finished slower than stage XX, can you explain why?
6. During game play of console A you chose to stand up, whereas console B you preferred to sit down. Any particular reason for this?

1 hour Stimulated Recall Interview Session

Participants might be invited to return for a one (1) hour Stimulated Recall Interview Session. The participants would be asked to view the recording of their game play session. During the viewing, the researcher would ask questions to clarify the participants' actions or emotion. The stimulated recall interview would be held after the researcher has analysed the video recording. Examples of questions that might arise are:

1) Do you notice the motion you made at that moment (the researcher pointing at the video). Can you explain that motion?
2) Do you notice your facial expression during that stage? Can you explain what you were thinking then?